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ABSTRACT

Focusing on the right to read, the articles in this volume were drawn from the twentieth annual meeting of the National Reading Conference held in 1970. Among the topics discussed in the 50 articles are the following: oral associates as predictors of verbal ability, reading readiness, the reading process, reading diagnosis, adult reading programs, critical reading and thinking, reading research, reading versatility, measurement techniques, reading comprehension, teaching reading improvement, establishing a reading program, reading ability, readability, flexible efficient reading, study skills, content reading, linguistics, and deprivation and achievement as factors in auditory comprehension. The volume also contains a brief keyword listing for use in locating information on specific topics. (FL)

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READING:
The Right to Participate

TWENTIETH YEARBOOK OF THE
NATIONAL READING CONFERENCE

Edited by
FRANK P. GREENE
McGill University

Published by
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1971

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PREFACE

I thought of calling this yearbook *Next Year: Maturity*. The NRC is twenty. Next year we reach 21. Upon attaining the age of majority, do we get maturity? Do we achieve the wisdom to solve the long term problems of college-adult reading?

I could have compared us to the student who says, "Next week I'll get organized." Of course next week is always a week away and the disorganization remains a life style. How many concerns of college-adult reading have we actually met? Mayhaps the condition exists that for the last twenty years 'next week' has never arrived for significant problem solving in college-adult reading. You can read in papers in this very book that it is to be hoped that soon (next week?) problems identified at least twenty years ago will receive serious attention. Many, many studies have been completed during this time. But there is real concern that the problems being looked at now are the same ones looked at last year(s). When next year arrives will we have achieved sufficient maturity to have gotten organized?

There are signs in this yearbook that lead us to hope that 'next week' has arrived: the massive data base and targeted research project: the careful attention to theoretical construct and model building; the beginning articulation of basic research efforts; and the start towards evaluating instructional programs to develop insights about how individuals change rather than simply trying to show differences between groups.

If this yearbook had been called *Next Year: Maturity,* then the next yearbook would have been called *Maturity?*. What will be the answer NRC will be able to make next year?

One of the major themes running through the papers in this yearbook is the right to read. However, it is not the right to read, but the exercising of that right which allows one to participate in the economic and political benefits of society. To guarantee the right to read is a clear and potent statement that society will no longer tolerate programs that simply transfer educational advantages from one group to another: All people must possess the basic literacy skills that are prerequisite to possible functioning in a literate world. However, for an individual, it is competent, efficient reading which provides the right to participate fully in society. Having the right to read does not insure that one will read. Beyond the basic skills which can allow reading to take place, wide and efficient reading is requisite to develop sufficient satisfaction with reading that one *will be* rather than *could be* a reader.

It is noteworthy that the National Reading Conference has a history of concern for both teaching *how* to read and teaching *to* read. In this yearbook too, you will find concerns, research, and programmatic suggestions related to basic skill acquisition (the right to read) and to efficient use of skills (being a reader).

The Oscar S. Causey Award for Outstanding Achievement in College-Adult Reading and the presidential address appear as the first and second papers. The annual review of research on college-adult reading appears as the final paper. All other papers appear in the order of presentation at the conference held December 3, 4, and 5, 1970, at St. Petersburg, Florida. The table of contents lists each of the papers printed. As an aid to readers who might wish to locate information on specific topics, a brief keyword listing follows. Page numbers following the keywords refer to starting pages of indexed articles.

- Blending: 227
- Cloze: 30, 219, 304
- Comprehension: Auditory: 67, 341
  - Reading: 30, 67, 182, 187, 198, 304, 312, 341
- Critical Thinking: 128, 137, 142
- Diagnosis: 53, 266, 320
- Language development: 118, 219
- Linguistics: 67, 118, 227, 312, 355
- Readability: 30, 348
- Reading: Adult: 46, 53, 60
  - Content fields: 237, 244, 249, 348
  - College: 3, 17, 168, 182, 237, 244, 249, 304, 336, 367
  - Critical: 128, 137, 142
  - Flexibility: 168, 174, 256
  - Intermediate grades: 11, 30, 198, 300
  - Junior college: 206, 211, 215, 252, 348
  - Primary grades: 38, 93, 219, 355
  - Programs: 3, 20, 46, 53, 60, 252, 336, 367
  - Readiness: 14, 283, 292
  - Secondary grades: 20, 30, 128, 137, 142, 266, 341
  - Specific skills: 28, 46, 320
- Research surveys: 20, 187, 256, 367
- Right to read project: 85, 93, 114, 118, 148, 157, 163
- Theories and models: 38, 67, 85, 93, 114, 118, 157, 266, 355
- Verbal learning: 11, 14, 17, 272, 283, 292, 300, 312
- Word recognition: 67, 73, 78

Happy Read*ing*.
F. P. G.

TABLE OF CONTENTS

Preface V

The 1970 Oscar S. Causey Award 1

Presidental Address
Present and Future Trends in College Reading and Higher Education
Alton L. Raygor 3

Oral Associates as Predictors of Verbal Ability–Symposium
Oral Language Responses and Reading Performances in the Intermediate Grades
Rachel T. Bickley, A. C. Bickley and Harry Cowart 11
Oral Associates and Reading Readiness
A. C. Bickley, James A. Dinnan and J. P. Jones 14
Syntagmatic Oral Responses and SAT Scores of College Freshmen
James A Dinnan, Rachel T. Bickley and John C. Williams 17

Characteristics of Secondary Reading: 1940-1970
Walter Hill 20

Grade Level Interpretation of Cloze Readability Scores
Earl F. Rankin 30

Specific Cognitive Factors in the Reading Process
John Downing 38

Adult Reading Skill Improvement–Symposium
Development of Specific Reading Skills in Adult Education
Eunice N. Askov, Wayne Otto and Thomas Fischbach 46
Diagnosis and Prediction of Reading Performance at the Adult Level
Kenneth L. Dulin and Roger F. Quealy 53
Making Adult Reading Programs Truly Adult
Richard J. Smith and Kenneth L. Dulin 60

Measurement of Critical Reading–Symposium
Learning from What Is Said and What Is Read
James T. Flemming 67
Comparison of Word Recognition Strategies of Adults and Children
S. Jay Samuels and C. C. Chen 73
Some Experiments on Visual and Aural Word Recognition
Joanna P. Williams 78

Modeling Reading. Targeted Research and Development Program in Reading: Right to Read Program—Symposium

Developing a Data Base for Model Building in Reading
Martin Kling 85

Theories, Models and Strategies for Learning to Read
Harry Singer 93

Modeling Reading Processes
John J. Geyer 114

Theories of Language Development and Their Relation to Reading
Irene Athey 118

Measurement of Critical Reading—Symposium

Correlational and Factor Analysis of Critical Reading and Critical Thinking—Twelfth Grade
John Follman, A. J. Lowe and Russell Wiley 128

Canonical and Partial Correlation of Critical Reading and Critical Thinking—Twelfth Grade
Roger Johnson, John Follman, Russell Wiley, A. J. Lowe and William Miller 137

Psychometric Analysis of Critical Reading and Critical Thinking—Twelfth Grade
A. J. Lowe, John Follman, Wade Burley, and Johnny Follman 142

National Research Planning for Reading (USOE)—Symposium

The Right to Read: A Progress Report
Julia E. Hamblet 148

An Engineer in Reading Land
Roger L. Sisson 157

The Research and Development Program in Reading
George D. Spache 163

Reading Versatility—Symposium

Reading Versatility Twelve Years Later
Arthur S. McDonald 168

Efficient Reading—A Way to Permanent Education
H. M. Nason 174

Problems Related to the Measurement of Reading Comprehension—Symposium

Criterion References Aspects of the Carver-Darby Chunked Test
Ronald P. Carver 182

Measuring Reading Comprehension: An Historical Perspectives
Roger Farr 187

Assessment of the Acquisition of Information from Reading Prose Passages
J. Jaap Tuinman 198

Problems Peculiar to Teaching Reading Improvement in a Junior Community College—Symposium

Problems of Junior College Reading Programs
Imogene Freer 206

Problems of Individualization
Clarence Anderson 211

Motivation: By Whom? For What?
Paul H. Schoenbeck 215

Oral and Oral-Written Language Measures with First Grade Pupils
Wendell W. Weaver and Albert J. Kingston 219

Some Linguistic Dimensions in Auditory Blending
D. L. Brown 227

Student Learning Skills Professors Take for Granted in Teaching College Mathematics, Foreign Language, and Science—Symposium

What Guidance Could Be Offered to the Student Alienated from the Foreign Language Experience?
Michael K. Lubic 237

One Approach to Teaching Quantative Methods to Graduate Students in Education
John F. Giblette 244

Study Skills Required in "Relevant" Biology Courses
Gerald G. Robinson 249

Establishing a TEAM Reading Program
Oliver Patterson 252

Assessment of Flexible Efficient Reading
Phil L. Nacke 256

The Multiple Group Informal Silent Reading Inventory
Horst G. Taschow 266

Verbalization and Learning of Paired Associates
John Manning Lane, Jr. 272

Studies of Word Association and Reading—Symposium

Some Implications from Paired Associate Learning on the Development of Reading Readiness
Thomas W. Mustico 283

System-word Associations of Deprived Children
Sharon Champion 292
Effects of Modality on Response in Word Association Tasks
Richard J. Reynolds 300

The Effect of Reading and Punctuation Variations Upon Reading Comprehension
David C. Johnson 304

Toward a Systematic Approach to How the Reader Uses Context to Determine Meaning
Mark W. Aulls 312

Classification of Factors Affecting Reading Performance
Edward B. Fry 320

The Impact of Today's Students Upon College Programs in Reading
Homer L. J. Carter 336

Deprivation and Achievement as Factors in Auditory Comprehension
David Sherman Bailey 341

Reading Ability of Junior College Students and Readability of Assigned Texts
Dorinda Ann McClellan 348

Implications of a Theory of Reading
Eric Brown 355

Annual Review of Research on College-Adult Reading
Emery P. Bliesmer 367

GEORGE B. SCHICK

THE OSCAR S. CAUSEY AWARD FOR OUTSTANDING ACHIEVEMENT IN COLLEGE-ADULT READING

Remarks of Hazel Horn Carroll in presenting the 1970 Oscar S. Causey Award to George B. Schick on behalf of the National Reading Conference.

On December 1, 1967 the National Reading Conference presented its newly created Oscar S. Causey Award to the first recipient, Arthur S. McDonald. The other awardees have been Albert J. Kingston in 1968 and George D. Spache in 1969.

As did these three, the man to be honored this year brings honor, dignity and distinction to the positions and organizations fortunate enough to have his services.

As a scholar he won distinction at the University of Chicago where he received his Ph.B., M.A., and Ph.D. degrees.

A successful teaching career followed which included graduate and undergraduate courses in English and American literature, and developmental reading teacher training courses and workshops. In addition, he has taught developmental reading classes on college and adult levels and courses in technical writing.

These courses have been taught at the University of Arkansas, Beloit College, Gary Indiana Junior College, University of Chicago, and at Purdue University where he taught from 1935 to 1969 and where he holds the title of Professor Emeritus. He currently is Professorial Lecturer in the School of Education at California State College at Fullerton, California.

Other distinguished careers of editing, writing, and lecturing have been conducted along with his successful teaching.

His publications, which include books, articles and manuals, fall into two main categories. They are literary and historical, and technical and professional on reading improvement.

He has written over fifty articles in such publications as *Personnel Journal, Journal of Communications, Research Reviews, Journal of Reading, Journal of Higher Education, International Reading Association Conference Proceedings, National Reading Conference Yearbooks* and many others.

Textbooks he has authored, or co-authored, include *Handbook for Instructors in Developmental Reading, Guide Book for the Teaching of Reading,* and *Reading Improvement for Executive Development,* Psychotechnics Press, and six volumes of *Design for Good Reading,* Harcourt, Brace and World.

Conferences, institutes, and workshops all over the country have scheduled our honoree as speaker. He has been consultant to high schools, colleges, and the U.S. Navy and several publishers. Educational Development Laboratories had him as consulting editor for Controlled Reading Films, set K L, and the *Listen and Read Tapes.*

George Schick's editorial work claimed much of his time. He served as editor of the *Journal of Developmental Reading* and the *Journal of Reading.* He has been co-editor of the *National Reading Conference Yearbook* and is serving on the Advisory Board of Editors of our *Journal of Reading Behavior.*

To sum up our awardee's careers we can say, "We have read him, we have heard him, depended on him, quoted him, admired him," and now we thank him and honor him by presenting the Oscar S. Causey Award of 1970 to George B. Schick.

ALTON L. RAYGOR
University of Minnesota

PRESENT AND FUTURE TRENDS IN COLLEGE READING AND HIGHER EDUCATION.

NATIONAL READING CONFERENCE
1970 PRESIDENTIAL ADDRESS

This is the twentieth NRC Annual Conference: which means that during the next year we will presumably come of age. In line with the general trend toward earlier maturation, we've already reached some kind of landmark in this organization. We've already had our history written. Dr. Lester Van Gilder did some empirical investigations of The National Reading Conference and wrote a history of the organization as a dissertation at Marquette University. So we now have our collective memoirs written at age twenty. I wonder what will be happening when life begins at forty for this organization.

The pace of professional activity seems to me to be quickening. This past year has been the busiest and most exciting year of my life. The many new professional colleagues I have met as visitors to my campus and on my visits to other campuses has given me a most graphic (and fatiguing) view of the rate of growth in our field. I have also been involved in planning sessions on the Right to Read Effort and the forthcoming White House Conference on Children and Youth. Besides giving me a chance to log too many hours of flying time in and out of Washington and to and from a number of colleges, my year's experiences have given me a kind of perspective on the field of reading and its place in higher education that I never had before.

Some of the trends I see developing in reading and in the rest of the educational enterprise seem to me to need examination, because they promise or threaten to make major alterations in our professional lives.

I want to discuss some of the trends I see, and to speculate a bit about what meaning they have for the future.

As you probably know the primary thrust of the Right to Read Effort is in the direction of a massive mobilization of national resources to upgrade reading performance through strengthening of current programs and through development of innovative, fail-safe, criterion-referenced, quality-controlled instructional systems. The Right to Read forum of the White House Conference on Children and Youth will next week pass on recommendations to the President for legislation to support and implement that concept. The growth of individualized instructional systems has some very far-reaching implications that I think are worth examining. I propose to look at what happens when we start thinking about instructional systems and the mass application of them in public education.

TRENDS IN THE DEVELOPMENT OF INSTRUCTIONAL SYSTEMS

Some of the trends that are already visible are rather startling. First let's look at some trends in the development of the ways in which people get taught in an instructional system. By instructional system's I don't mean just software and hardware. I mean the whole instructional system; the school, the teacher, the society. Some of the components in this system are being changed rather radically. For example, you look at the development of instructional systems in education. We have a long tradition in which instruction has been imbedded in a medieval concept of a university, packaged up into courses, credits, and similar concepts. We are increasingly seeing instructional systems being devoted to situations where the need for specific instructional goals has become apparent and the instructional goals are taken as the starting point for the development of the instructional systems. The goals determine the nature of the instruction: staffing; software; hardware; and timing. This is a radically different approach.

When you look at the techniques by which instructional systems are created, again you have a new, radical shift. In the old days the teachers were selected by administrators. Teachers taught "content" in packages of information called courses. The materials were obtained by picking out a distinguished professor and having him write a book that would be acceptable to his colleagues. Now the development of instructional systems is quite different. Creation now starts with a master plan for the whole system, involving a large number of people in the planning and the carrying out of the system. It usually involves technique studies, differential sequencing studies, error rate studies, outcome studies, and many other steps in the careful production of a set of learning experiences. The product of all this is the result of much effort by many hands over a long time span.

The size of the necessary developmental efforts has resulted in the growth of a new kind of entity in the educational enterprise. I refer to the new type of commercial and semi-commercial, profit and non-profit corporations which essentially take over the function of both teacher and materials. I'm thinking of such things as Systems Development Corporation, General Learning Inc., Westinghouse Learning Corporation, Learning Technology Inc., and Xerox Learning Systems. The relationship between such corporate and semi-corporate entities and the public and private institution is a very interesting thing to watch because it is becoming increasingly difficult to say where the private sector stops and where the public sector begins. This kind of relationship may get to be a real problem for some of us. For example, we may get into performance contracting in teaching reading at the college level. (If you want to have nightmares, think about that.) We're doing it in the elementary school. We're about to do it in the secondary school. Who knows?

Another trend is toward tremendously increased costs, and at a time when public support of education is in some danger because of shortage of funds. In the old days we got our materials in a relatively inexpensive way. That professor who was writing the textbook was maybe operating on a five hundred dollar advance from the publisher. Now, when instructional systems are created, it involves contracts with many people, usually with some institution or institutions. It involves consultants, editors, writers, production designers, testing and evaluation specialists, and all sorts of other people. It's a whole new sub-economy.

When you consider the techniques by which instructional systems are created, you see the need for all the complexity. For example, the steps that are necessary in the development of an effective instructional system are:

1. General development of the system design
2. Development of rationale for sub-systems or component parts
3. Development of instructional plan for each component
4. Developing the logic of instructional sequencing
    a. ordering concepts
    b. developing measures of difficulty
5. Determining optional difficulty for materials and tasks
6. Selection of techniques for producing materials or experiences
7. Technique Studies to determine optimal approaches
8. Error rate studies on materials and experiences
9. Evaluation of acceptability of techniques of training to teachers and students
10. Tryout across populations to determine generalizability of results
11. Outcome studies—comparisons with control groups or with other techniques, including criterion achievement studies
12. Revision based on formative and summative studies

The reason that this long process is expensive is not just that it involves a lot of people, but because it involves a longer and more expensive developmental process. For example, I have been involved in one rather primitive instructional system in which one of the pieces of it went through eight experimental editions and the developmental costs were fourteen times the publisher's usual developmental costs. So we see a fantastic explosion in the cost of producing instructional materials—a trend that really frightens publishers. I don't know if it frightens reading teachers.

Another trend is toward examining hardware, software, instructional services, personnel, and everything else in the instructional systems from the point of view of specifications rather than credentials. In the old days we would select people, materials, and hardware by looking at the qualifications of the people rather than the outcomes produced. Now we find ourselves asking things like the following:

1. Statement of objectives—observable outcomes are anticipated?
2. Criterion measures—procedures are available to measure the accomplishment of outcomes?
3. Specification of components—precise description of materials and procedures?
4. Learner prerequisites—specification of those for whom program is appropriate?
5. Teacher requirements—training necessary and specification of procedures to follow?
6. Evidence of reliability— (will it work everywhere every time?)
7. Estimates of time, cost, and cost-effectiveness?
8. Availability?
9. Documentation—factual or substantial support for statements made?

Another trend is toward more widespread participation in the development of instructional systems in reading and in other fields. I know of a situation where the development of one component in an instructional system involved systematic tryouts of material in New York, California, Florida, Michigan, Minnesota, Maryland, Iowa and Illinois. This involves a great deal of need for coordination of efforts, and sometimes results in a publishing company becoming responsible for the management of a whole set of related research projects—a new role for them.

TRENDS IN DELIVERY SYSTEMS

The second major category of trends I see are the delivery systems for instructional efforts; changes in the ways that we get the students and the system together. Again, let's look at the way instructional materials have been made available to students in the past. The publisher's representative talks to the professor and sends out a complimentary copy of the book. If the professor likes it, it is adopted. Now we have travelling consultants on instructional systems. The adoption of an extremely expensive and large instructional system is a very complicated business. It takes a major contract proposal to get something like Dorset Industries taking over part of Texarcana schools, for example. It's a major event in the school system when that happens. It involves demonstrations and conferences. Many people are involved in those decisions. Many people have to live with the decisions after they are made. This is why I say changes in delivery systems may have real impact on your professional lives. Sometimes it even turns out that the resident consultant who stays on the scene and makes sure the thing works, tends to accumulate more political power than the principal used to have. The locus of responsibility for policy-making in the school or college may begin to shift.

There are also some other trends in the nature of delivery systems that have to do with the use of new instructional technology. For example, our schedules get very complicated. As soon as you start talking about modular packages or instructional units that are variable in length by individual, the old academic semester system becomes an obsolete concept.

You also get into radical changes in equipment and space needs, grading procedures, and screening of students. I think it's very clear that we are increasingly abandoning the notion of screening students to make sure that they have "the ability to go to college."

One major problem is the changing role of the teacher. The instructional materials in some systems do most of the teaching, and the teacher is out of a teaching role and into a management role.

The cost problem exists in the delivery system as well as in the development of materials. Costs charges range all the way from some situations in which instructional systems will save money (by having the students sharing books and doing only things they need) all the way up to computer assisted instruction terminals with their accompanying astronomical costs.

TRENDS IN SOCIETAL INFLUENCES ON EDUCATION

Trends in the development and delivery of new educational technology are interacting with other changes in the society and some subtle shifts in our national value systems. We have, for example, a very strong national outcry in education for accountability. Many people are asking questions about the cost of education and are demanding evaluation based on outcomes rather than program process costs. The cost-effectiveness factor is getting more and more important and we're going to have to start arguing for innovations in instructional programs on the basis of their ability to do a good job and to save money. College basic skills programs are going to be increasingly subject to the demand for cost-effectiveness considerations.

At the same time that we're getting pressure for specific outcomes, which I think leads us somewhat to a kind of predictable, rather structured learning situation, we are getting a very strong outcry for an increasing humanism in our institutions. We have the whole sensitivity training movement, the emphasis on relationships, and the rejection of materialism and technology that is characteristic of almost a whole generation. Add to that the revolt against size. Inevitably college reading programs are going to be influenced by these concerns.

We are also seeing in higher education a curious renewal of the old special-general education argument. I've been spending a lot of time on the campuses of new junior colleges and community colleges. They are having the old arguments all over again about nature and the role of higher education. You run into some really strange things. The dean who invites you to come to help them set up a basic skills program has one perception of the nature and role of the institution. When you get there it turns out the board has a totally different picture of the structure and role of their institution. The issue of technical versus general education is alive again. The old "two years of general education and two years of specialized education" compromise that we've all lived with for so long, is breaking down very rapidly. My instincts are on the side of the generalists in this argument but my prediction is that the technocrats are going to win out again, and that we are going to go increasingly to technical education.

In some places the demand for technical education produces some new institutions that our reading programs are not very well equipped to handle. We are not really well tooled up to do the things that need to be done to help the students who are in a welding curriculum. Our materials simply do not fit the needs of many students.

Another trend in higher education has to do with the constant pressure to "upgrade" institutions. The institution moves from a normal school to a state teachers college to a state college to a university. I was in a town in Iowa recently. I saw all four names of the institution on signs before I got to it. They changed their name so fast that they hadn't even taken down the signs. This constant change is giving some impetus to the creation of new institutions that start at the bottom of that process. Many people say we have to interrupt that system; that we need technical schools that are going to stay technical schools and where the "transfer faculty" doesn't always win the game and make a junior college into a four year college.

Another trend I see in higher education that inevitably is going to influence us is the potential end of the non-political nature of institutions of higher education. I see an increasing radicalization of both faculty and students. We seem to be shifting our priorities away from the old concept of academic freedom to a new concept that includes a concern for social and political crises. That has its advantages and its dangers. I see us somewhat moving toward the South American or Oriental model of a university, in which the university is a major force in the political and intellectual life in the community and provides intellectual leadership for revolution. I think we're going to see this trend increasing. It looks as though we may be over the hump as far as the demonstrations in the street are concerned, but we are apparently not over the hump yet with the "crazies" blowing up the buildings. The emphasis seems to have shifted from large scale student demonstrations to small scale guerrilla fighting. College reading programs may be increasingly subject to demands for more "relevant" materials, especially since the minority groups being recruited often have the greatest need for basic skills.

A related trend has to do with the tremendous democratization of higher education. We have finally come to the point of view that higher education is good for people, and we're even beginning to think that if it's good for people, we ought not to deprive them of it. So we are increasingly getting all segments of our society into higher education. As a result of that, we're getting tremendous increase in what you and I call remedial cases. About seventy per cent of the students entering junior colleges are getting some kind of remedial help in basic skills, and that certainly was not the case in four year colleges twenty years ago. We are running into more and more students who simply cannot read their textbooks.

SOME SPECULATIONS ABOUT THE FUTURE

Let's speculate about what's going to happen in the future to reading programs. I thing this advance of technology is going to continue. It never has stopped before. In spite of the resistance to it on economic, political and philosophical grounds, we are not going to stop the increase in technological growth in our society. Our programs will have to respond accordingly. We are also going to have to fit into a curriculum that will increasingly match the nature of the external political and economic realities. That's going to be demanded of us. I think higher education is going to become more highly individualized, and we're going to need a great deal more flexibility than we have had in the past. As I said earlier, I think the liberal position is going to weaken. I find that unfortunate, but I think it will weaken. In spite of our need for a liberal education position in dealing with social and moral problems, the curriculum is probably going to become more rigid in some ways, in spite of its being more individualized.

I think colleges and universities may not survive as we know them. Many students, maybe the majority of them, feel that colleges and universities as they are now constituted are a real anachronism. The public feels that they're the cause and hotbed of revolt. We hear rumors of administrative committees in major American universities considering putting barbed wire around the campus. Though no one has made that decision yet, me may yet be conducting our programs in the midst of armed camps.

Another prediction I would make is the locus for responsibility for learning is going to continue to move toward the teacher and the institution rather than being loaded on the student. Remember the old excuses; "well he really wasn't ready for college," or "he's really a pretty dumb kid," or "he's really a dyslexic." These aren't going to work anymore. We simply can no longer take the position that we're not responsible if the student doesn't master what we try to teach him. We may even have to show that we're really useful and effective in college reading programs.

To conclude:

If we continue to make the same rate of progress in educational technology –

If we can find ways to work new types of business and educational organizations into higher education –

If we can develop fail-safe instructional systems–

If we can adapt staff and students to the needs of the new technology–

If we can find ways of financing the incredible costs of effective learning systems–

If we can do all this without losing the essential humanity that first stimulated the creation of higher education–

If we can take advantage of all we have learned in the past about reading instruction and not try to rediscover the universe–

If we can really get the politicians to put our money where their talk has been–

If we can get the Right to Read Effort to show new ways to solve national educational problems without becoming a huge political and economic boondoggle–

Then we can expect to see miracles.

I have great optimism, for the first time in years.

If you had asked me a year ago–will anything really happen in the next twenty years to make a real difference in how well children and adults learn to read, I would have said "No."

Now I believe we have a good chance of seeing things most of us would not have believed possible.

Let's hope that before life begins at forty for the National Reading Conference, that, like Jules Verne, we have the age-old experience of having our most optimistic predictions become underestimates.

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ORAL LANGUAGE RESPONSES AND READING PERFORMANCE IN THE INTERMEDIATE GRADES

Bickley, Dinnan, and Bickley (1970) indicate that high syntagmatic scores from oral language responses parallel scores on group intelligence tests, that students who tend to give a larger number of syntagmatic responses score low on intelligence tests. Other studies indicate that close correlations have been found between association tasks and reading skills. Bateman (1963) reports that association tasks are consistent predictors of high level reading skills while Ohnmacht, Weaver and Kohler (1969) show that association tasks are closely related to general verbal ability. The purpose of this study was to determine the effectiveness of oral language responses as a predictor of the reading performance of students in the intermediate grades.

Ervin's (1957) classification of oral responses as paradigmatic or syntagmatic was modified in the following way: responses that illustrated the relationship of superordinate (apple-fruit), co-ordinate (arm-leg), contrast (white-black), or part-whole (branch-tree) were accepted as paradigmatic. All other responses were classified as syntagmatic items.

The subjects were fifty-two, fourth year public school pupils who were enrolled in a summer reading program in a southern city. The data were collected through administration of the *California Reading Test, Form W* and the Oral P/S Language Inventory. The thirty stimulus words which make up the Oral P/S Language Inventory were compiled from the Fitzgerald and Fitzgerald (1963, 1967) list of a basic communicating vocabulary.

The *California Reading Test, Form W* was administered in a group session early in the summer. The reading scores were arranged from high to low. Using a median split, there were twenty-six subjects in each of two groups. Scores for the low group ranged from Pre-primer to 3.2; scores for the high group were from 3.5 to 4.6. According to the *California Reading Test,* all of the subjects were reading at or below grade level.

The Oral P/S Language Inventory was administered shortly after the *California Reading Test* was given. The subjects were asked to listen to the stimulus word and to give the first word that came to mind as the examiner recorded the responses. The Inventory was administered individually and thirty responses were recorded for each subject. The responses were identified as paradigmatic or syntagmatic items according to the classifications given earlier in this paper. The stimulus words used in this Oral P/S Language Inventory were:

1. in
2. she
3. go
4. up
5. old
6. day
7. king
8. life
9. work
10. father
11. high
12. city
13. war
14. open
15. white
16. morning
17. pay
18. laugh
19. front
20. short
21. poor
22. happy
23. hot
24. South
25. easy
26. pretty
27. against
28. wife
29. smile
30. foreign

A t-ratio was derived from the number of syntagmatic responses given by the subjects. The results of the analysis are given in Table 1.

Table 1

Syntagmatic Responses

Group	Mean	SD	t
High Reading	10	8.23	2.24*
Low Reading	15	7.81	

*$p < .05$

The number of syntagmatic responses for the high reading group ranged from three to thirty with a mean of ten. The low reading group achieved scores that ranged from four to thirty with a mean of fifteen. The P/S Language Inventory has a test-retest reliability correlation of .78

The results of the study suggest that one can predict a subject's reading performance on the basis of his oral language responses. A subject who gives more than fifteen syntagmatic responses will obtain a lower score on the *California Reading Test* than a student will who tends to give paradigmatic responses.

While these results suggest that perhaps one could easily develop his own quick (three-minute) informal reading inventory for the classroom, they would also seem to suggest the possible advantage of training children in the area of word associates. Since it is apparent that reading tests may make extensive use of paradigmatic word-associates, the ability to respond in this manner would certainly enhance the child's academic pursuits.

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ORAL ASSOCIATES AND READING READINESS

The relationship between oral associates (either paradigmatic or syntagmatic) and scores achieved on a reading readiness test was examined in this study. Paradigmatic associates are those responses which demonstrate superordinate (apple-fruit), co-ordinate (arm-leg), contrast (white-black), or part-whole (branch-tree) relationships, while all other responses are defined as being syntagmatic.

Fifty-two first grade public school pupils from a small city in Georgia that did not provide kindergarten facilities were the subjects for the study. The *Metropolitan Readiness Test* was administered during the sixth week of the Fall term, 1970, and the Oral P/S Language Inventory was completed during the seventh week of the same term. This list was developed from *An Integrating Basic Communication Vocabulary* (Fitzgerald, 1963).

All subjects were given the *Metropolitan Readiness Test* in group sessions as prescribed by the test manual. The subjects were divided into a high group and a low group according to a median split. There were twenty-six subjects in each group.

Given the directions, "Give me the first word you think of when I say this word" each subject was tested individually with the Oral P/S Language Inventory. All thirty words were administered orally and the examiner wrote the response down next to the stimulus word. Stimulus words used in this Oral P/S Language Inventory were:

1. in
2. she
3. go
4. up
5. old
6. day
7. king
8. life
9. work
10. father
11. high
12. city
13. war
14. open
15. white
16. morning
17. pay
18. laugh
19. front
20. short
21. poor
22. happy
23. hot
24. South
25. easy
26. pretty
27. against
28. wife
29. smile
30. foreign

The results of the language responses were analyzed according to the paradigmatic-syntagmatic dichotomy and subjected to a t test for significance. The results of the analysis are noted in Table 1.

Table 1
Syntagmatic Responses

Group	Mean	SD	t
High Readiness	17	7.42	7.9*
Low Readiness	29	.32	

*$p < .01$

The difference on syntagmatic responses was significant: the low group had significantly more syntagmatic responses than did the high group. A reliability estimate of .78 was obtained by a test-retest of the Ss.

These results would seem to indicate that since readiness tests probably measure to a great extent the child's ability to respond paradigmatically, academic success would be enhanced by early training and practice with associates that are paired paradigmatically. It would appear that these results support Samuels and Wittrock (1969) who suggest that even minimal amounts of word-associating training would aid in the teaching of reading. This would also seem to be in line with the Staats and Staats (1963) recommendation for the use of word associates incorporated into the development of primer texts.

If, as Ervin (1957) suggests, a young child responds normally to associates with a predominance of syntagmatic responses and that as Entwisle (1966) found that the paradigmatic increase comes with age, it would seem that the process could be accelerated by training.

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SYNTAGMATIC ORAL RESPONSES AND SAT SCORES OF COLLEGE FRESHMEN

This investigation was undertaken to ascertain whether there were differences in the verbal performance of college freshmen. Students identified as high risk students were compared with college freshmen who were thought to have a very good chance of succeeding in college because of their performance on the Scholastic Aptitude Test. The verbal responses were to be recorded and analyzed according to a paradigmatic or syntagmatic classification. Specifically is there any relationships between verbal responses, which are classified as syntagmatic, and scores achieved on the verbal section of the SAT? Paradigmatic responses are those responses which have the following classification: superordinate, coordinate, whole-part or are a contrast. All other verbal responses shall be classified as syntagmatic. (e.g. dark-*night,* dark-*skin,* hot-*rod,* hot-*sun*).

Sixty college freshmen, 30 from a liberal arts institution in Pennsylvania and 30 from a state university in Kentucky were classified as high or low risk students according to verbal scores achieved on the Scholastic Aptitude Test. The mean SAT score for the high risk group was below the national average for high school seniors tested in 1969-70. (College Board Reports 1970). The low risk group had a mean above the national SAT average.

All subjects were individually tested on the C/A Oral Language Inventory. The directions were "Give me the first word you think of when I say this word." No trials were given, 30 responses were recorded by examiners. The C/A Language Inventory took about 4 minutes to administer. The C/A list of words were compiled from Paivio's (1968) list of concrete-abstract words. The C/A list contains 21 words found on the AA section of the Thorndike-Lorge (1944) frequency count, 4 on the A section and 5 from 1-49. Stimulus words used on this Oral C/A Language Inventory were:

1. book
2. king
3. joy
4. arm
5. life
6. soul
7. fun
8. river
9. fact
10. apple
11. boy
12. duty
13. star
14. bravery
15. idea
16. toy
17. charm
18. wife
19. love
20. rock
21. time
22. pride
23. cat
24. honor
25. tree
26. woman
27. truth
28. car
29. bird
30. greed

The results of the language responses were analyzed and subjected to a t-score test for significance. Table 1 shows the results of this analysis.

Table 1

Syntagmatic Responses

Group	Mean	SD	t
High SAT	13	3.25	13.33*
Low SAT	22	1.77	

*$p < .01$

The difference between high and low verbal SAT achievement and the mean syntagmatic responses was significant at the .01 level of confidence. College freshmen with poor verbal ability, as indicated by scores on the verbal section of the SAT, responded with a significantly higher portion of syntagmatic responses. A further analysis of the syntagmatic responses indicate that the individual is responding with an internalized meaning or an independent experience to the stimulus word (e.g. apple-*pie,* love-*beer,* wife-*Rose,* car-*Buick*). This type of free association is *not* rewarded or even accepted in the realm of achievement testing. Since rewards are given to those who conform to "acceptable standards" this possibly creative individual is relegated to the category of "risk" students. An awareness of what is expected in testing might change the whole picture for a given student.

The findings of this investigation do not agree with a statement made by Ervin (1961) "that a syntagmatic-paradigmatic shift occurs between kindergarten and sixth grade". It seems that the shift is not a product of maturation, but a learning which might not take place even at the college level. Those subjects who have not made a substantial paradigmatic shift will do poorly on exams which view such criteria as accepted "adult" or "educated" behavior. Gagne and Wiegand (1970), investigating the effects of the use of superordinate type context on the learning and retention of facts, find that if superordinates are used the organization has a positive effect on a subject's learning. The subject will do poorly if this type of structure is absent. Syntagmatic verbal behavior shows a lack of awareness of a superordinate or coordinate structure or at least the lack of using such a structure as a means of "educated" communication. Bickley (1970) in an investigation of young adults language responses indicated that if a subject is functioning syntagmatically he will do poorly on the Otis Mental Maturity Test.

It seems that if a student is going to achieve acceptable results on tests which use a paradigmatic frame of reference for "correctness" then learning a structure of superordinate, coordinate, whole-part, or contrast is extremely important. An examiner can predict, with a good degree of accuracy, how an individual will perform on the verbal section of the *Scholastic Aptitude Test* through assessing his verbal responses.

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CHARACTERISTICS OF SECONDARY READING: 1940-1970

Little specific attention has been given to the emergence and development of secondary reading programs. The earliest professional society publications to treat secondary reading tend to subsume reading as a function of general teacher activity. The usual historical sources on reading give the secondary reading program but brief attention. While numerous descriptions of specific school programs have appeared in the literature during the past two decades, these seldom provide details on their program antecedents. This absence of historical analysis of the collective development of organized secondary reading activity suggests a conceptual deficiency which deserves attention.

It is the intent of this paper to identify some of the more notable developments which have characterized the evolution of secondary reading programs in the United States and to critically examine some of those characteristics which bear upon current and future status of the area. Several limitations which imposed upon the paper need to be noted. The brevity of time and paper length restrict consideration to major trends and developments. In the absence of usual historical records, the observations herein are based primarily upon a review of twenty-five surveys of secondary reading activity which were published between 1942 and 1970. Sixteen of the most pertinent of these surveys are identified in Table 1.

The review focussed particular attention upon planned program activity in order to avoid the procedural difficulties which would have

Table 1. Representative Surveys of Secondary Reading Programs

Survey	Date	Area	Target	Sample	Data Source	(%) Provision Incid.	Prog.	Prog. Type (%) Response Con.	Eng.	Rd. Cl.	Rem.	Limitations (By Data Source)
NEA	1942	U.S.	Second.	2275 (V)	Prin.	80	44	7	69	45	6	Staff apathy
Witty/Brink	1947	U.S.	Sec/Rem.	400 (V)	Staff		21		x		x	Narrow scope
Buck	1955	N.Y.	7 & 8	103 (SR)	Staff	x			x			Staff training & apathy
Smith	1956	Mich.	Sec/Sp.Pr.	128 (SR)	Prin.		40		14	41	30	Few specialists; minimal resources
Grissom	1959	Ill.	Sec/Sp.Pr.	648 (T)	Staff		17				x	Staff apathy; minimal resources
Baughman	1959	Ill.	Jr. High	133 (V)	Staff		64		60		30	Few spec., staff apathy
Patterson	1961	Mass.	Sr. High	249 (T)	Prin.		42		x			Admin. problems
Geake	1961	Mich.	Sec/Sp.Pr.	128 (SR)	Prin.		50		17	41	30	Same probs. (1956)
Maderia	1961	Penn.	7&8/Mandate	369 (Sel)	Prin.		100		x	x		Staff training
Cawelti	1962	Mid-West	Sr. High	42 (Sel)	Staff		64		50		55	Narrow scope
Simmons	1962	No.-Cen.	Second.	127 (SR)	Admin.		66			x	x	Min. train.; scope
Martin	1967	No.-Cen.	Second.	151 (SR)	Admin.		78		x	x	x	Same but improved (1962)
Gordon	1968	Ind.	Jr. High	96 (T)	Admin.		68		x		x	Minimal scope; apathy
Graham	1969	Calif.	Second.	303 (SR)	Prin.		75		51	33	21	Funds: Staff training
Farr, et.al.	1969	Ind.	Second.	550 (T)	Prin.+	46	78	3	73	47	40	Funds; few spec.
Bowren	1969	N.M.	Second.	217 (T)	Prin.+		37		x		x	Apathy; few spec.

Interpretation. Sample: **(T) Near total sample of target; (SR) Stratified Random; (V) Voluntary but loosely controlled response.** ***Programs:*** (Con) Content teacher based activity; (Eng) Reading instruction handled by English staff; (Rd. Cl) A class for reading instruction, per se; (Rem) Program or provision of a definite remedial emphasis. % of Program Type is in terms of average response where definite programs were reported. *x* indicates report of emphasis but lacking quantification. *Incid.* refers to report of incidental attention to reading by general staff. The Smith-Geake and the Simmons-Martin pairings are replicated studies.

accompanied the analysis of ubiquitous incidental reading activity which *may* take place during content instruction. One of the earliest surveys located will serve to illustrate both the value of this delimitation and the difficulty of effecting it in an exact sense. In 1942, the NEA sent a secondary reading program questionnaire to principals throughout the country. Of the 2275 responding, 2110 reported that "provision for reading" was made in their school. Eighty per cent of this provision was reported as the normal function of the content area instructor. However, further investigation of the results reveals that 90% of these administrators considered their content staff to be *not* interested in the reading development of students! No rigid definition of the reading program in terms of its usual academic criteria could be employed without eliminating most of the data sources available, and, indeed, many of the current program descriptions, as well! A secondary program was considered as such if the report indicated a sense of conscious planning and activity which went beyond general, content area, instructional objectives.

THE EMERGENCE AND GROWTH OF SECONDARY READING

Secondary reading activity, in the organized sense, largely developed after 1940. However, concern about the reading needs of secondary students as well as a loosely structured attention to those needs in some school setting predated the emergence of planned programs. An overview of the development of secondary reading should begin with the early 1900's.

Pre-1940

It is possible that the secondary teacher provided more incidental help with the learning and language processes at the turn of the century than has been provided in modern schools. Paul Roberts has suggested that prior to highly specialized secondary teaching fields and large classes, most content teachers considered it their responsibility to develop student writing skills. A similar case might be made for reading instruction, particularly where the interpretation of the textbook was concerned. A more focalized involvement with secondary reading emerged during the 1920's. Public attention was drawn to the extent of reading deficiency among enlistees during World War I. After the war, changing technological patterns, the occupational difficulties of the Great Depression, a growing sophistication among the citizenry, and a body of available literature, among other broad cultural factors, reinforced public and professional awareness of the value of a secondary education as well as for adequacy in reading skill.

Smith places the emergence of professional attention in secondary reading about 1930 (1965, p. 269). In 1928, Yoakam published his *Reading and Study*, an insightful treatment of these two processes which carried considerable implication for secondary school instruction. Some earlier studies of the reading process had been made which utilized young adults as subjects, and the fact that these were applied more readily to reading instruction at the elementary school and college levels is predictive of the way secondary reading instruction will lag behind its school level counterparts in the coming years.

Some reading instructional activity of a planned nature was taking place in secondary schools by the mid-1930's. The survey made by the NEA in 1942 reported that 587 of 2275 responding schools made some special provision for reading problems. Of these 58% had done so for at least two years, and 20% had provided such attention for more than five years. However, much of this was developmental-remedial help tendered in content classroom settings, generally English, and hardly could be classified as structured or even self conscious. Approximately forty high school-college reading skills textbooks or workbooks and perhaps another twenty-five how-to-study books were published between 1930 and 1940. This is not hard evidence of the establishment of secondary reading even in the conceptual sense, but it presaged the development of more systematic instructional efforts.

1940 to 1950

Where the development of secondary reading is concerned, World War II exerted both a positive and negative influence. It depleted graduate schools, college faculties, diluted the thrust of professional education, and seriously inhibited educational research efforts until the latter 1940's. On the other hand, it once again aroused public and professional concern about the literacy levels of young Americans, and reinforced the concepts of a pragmatic secondary curriculum and a compulsory secondary education. The G.I. Bill provided the means for many former teachers to take graduate degrees, and since both the fields of psychology and professional education were showing a growing interest in reading as an area of research and professional activity, some benefit was accrued in the secondary reading area.

Later in this period, there were signs that the concept of planned secondary reading activity was finding its way into professional consciousness, even though thorough reading programs of any sort were rather infrequent. Descriptions of secondary reading efforts made in individual schools began to appear in the professional literature. A few universities began to offer courses dealing with secondary reading. Several additional textbooks appeared as well as a number of miscellaneous articles about secondary reading. Toward the end of the Forties, two sources were published which carried at least symbolic significance for secondary reading: *Reading in the High School and College*, the Forty-Seventh Yearbook, Part II, of the NSSE (1948) and "Improving Reading Instruction in the Secondary School," which comprised the entire February, 1950 issue of *The Bulletin* of the

NASSP (1950). With their appearance, the professional legitimacy of secondary reading activity seemed established in concept, if not in vigorous action.

1950 to 1960

During the Fifties descriptions of reading programs written by program personnel as well as by reading "authorities" began to appear regularly in the professional literature. Professional groups concerned with reading at the upper levels were formed, among them The National Reading Conference. The *Journal of Developmental Reading* was established at Purdue University and concentrated upon publishing reading literature pertinent to the high school and college levels. In terms of professional thinking as represented in the literatur, reading programs increasingly were differentiated from incidental reading activity. Surveys conducted during the period revealed a gradual growth in special reading programs. As a rough estimate, perhaps no more than one-fourth of American secondary schools provided planned instruction in reading.

Programs tended to fall into certain classifications which could be traced to developments in the previous decade. The "remedial" reading class or program was one of the most common secondary types, which is hardly surprising in view of the fact that many teachers and school officers still believed that reading was an elementary school subject. Furthermore, the rather simultaneous emergence of the concepts of secondary reading, remedial reading, and the reading specialist in professional training programs during the late 1940's and early 1950's tended to homogenize their images. Two other approaches, sometimes combined in operation—the reading "rate improvement" course and the "reading-study skills center" were rather direct transfers from the college reading laboratories which served as the base for much professional training during the period. The fourth pattern, the "developmental" reading skills class appeared with increasing frequency during this period, particularly at the seventh and eighth grade level, and seemed to be a product of combining the extension of the elementary basal reader program concept with the pragmatics of letting English departments assume major responsibility for reading instruction. This classification of separate program types did not always hold up when specific school efforts were given close scrutiny. It was not uncommon for developmental classes, remedial programs, and rate-study skills centers to overlap considerably in curricula, objectives, materials, and methods employed.

1960 to 1970

During the past decade, apparent progress in secondary reading could be observed by most of the professional indicators used for such purposes—the initiation and expansion of programs, the training and employment of secondary reading teachers, the quantity and quality of published literature, some increase in the quantity of research, increasing sensitivity to secondary reading problems and issues by the public and profession, the availability of a broader variety of instructional materials, and the establishment of service courses in secondary reading at many colleges and universities. During the first half of the decade, the growth in programs was no greater than the projected trend of the 1950's. In terms of program numbers, the increase during the latter half of the decade was dramatic, and could be traced directly to the impact of federal support through NDEA and ESEA funds.

A number of surveys of secondary reading activity were conducted during the Sixties. The results vary with the geographical area investigated, the design and sampling procedures, the school size, the school level, etc. In terms of reported figures, the percent of schools offering secondary reading programs increased about 25% during the decade, and may have included 75% of the schools in the more progressive states. At least one state had mandated reading instruction for the seventh and eighth grades, and subtle pressures toward reading preparation were being exerted on the preservice training and certification of secondary teachers in others. In terms of frequency, the program patterns of the previous decade continued to dominate the activity. The significance of packaged instructional aids became an influence; boxes of reading materials and hardware-related programs increased greatly in popularity, and some innovative instructional patterns with program implications were seen in multi-media and "programmed approaches." Social-political pressures and federal funds were producing token programs for "disadvantaged" students at the end of the decade.

CURRENT STATUS: SOME CRITICAL FACTORS

In spite of the gradual establishment of the secondary reading concept during the past three decades, and even considering the upsurge in secondary program numbers which has occurred in recent years, professional euphoria about the present status of secondary reading programs is hardly warranted. A close examination of the characteristics of these programs and the factors attendant to their evolution is somewhat sobering. A somewhat critical examination of some of these elements may be indicative of the challenges secondary reading programs will need to face in the coming decade.

After discounting the inflationary tendency of survey findings, perhaps as many as half of American secondary schools make some planned provision for reading improvement. More of such provision is made at the junior than at the senior high. There are notable variations in the density of programs reported. Higher estimates are reported for larger schools located in urban-suburban population settings, stronger economies, and higher levels of population literacy and education. Surveys also have a tendency to mask the vitality of reported programs; the program is reported regardless of its size, quality, or impact upon the school structure. Under these circumstances, a simple majority of secondary schools with some type of operating program seems like a small return for three decades of professional concern.

A notable discrepancy exists between the special functions concept of secondary reading programs in school operation and the "total thrust" effort which has been idealized by textbook authors and secondary reading authorities for over a decade. In name at least, a wide variety of program patterns exist, of which the following are representative: basal reader programs, developmental classes, corrective classes, remedial programs, rate improvement classes, college preparatory reading, reading-study skills centers, learning laboratories, reading impacted content instruction, and reading programs for disadvantaged learners. During the past decade, dual phase programs, usually developmental classes operating through the junior high English department augmented by corrective-remedial efforts at either the junior or senior high, tended to evolve out of earlier single phase programs. Total thrust programs, (i.e., developmental, remedial, content-area implementation, and special enrichment programs), are rarely reported.

There appears to be greater variation in program names than in program content and operation. From one school to the next, the programs termed "developmental," "corrective," "remedial," or "disadvantaged" are easily interchangeable. The availability of instructional materials tends to shape if not dictate program curricula and instructional procedures regardless of the name or objectives of the program. There is nothing holy about program names, but the dependency upon commercial materials and the lack of correspondence between program objectives and instructional content certainly suggests a lack of sophistication on the part of program administrators and staff.

The secondary programs which have been in operation have failed to establish a reputation of educational vialibility. Many administrators evaluate their schools' secondary reading programs as merely adequate. Some schools have dropped their programs. Reading test gains in terms of pre-post and comparative approach studies do favor reading program subjects. The narrower the program objective and the more concentrated the instructional effort, as in rate improvement courses, the more likely such gains result. Evidence of functional reading change (e.g., number of students successfully remediated), or of transfer value (e.g., improvement of content course grades), has been minimal. Beneficial impact of special reading programs upon the attitude and adjustment of problem readers (e.g., the reduction of drop-out ratio), has been reported; unfortunately, most secondary reading programs have not been sold to administrators and school boards on this basis, but rather upon the hypothesized remediation of problem readers and the functional improvement of academic performance.

Some secondary reading programs have demonstrated much greater success than others by a variety of criteria—student skill improvement, transfer of training, administrator opinion of success and viability, and by expert rating. Certain conditions tend to be associated with the operation of successful programs: (a) the presence of a trained, active, and personable reading specialist at home in the secondary school setting; (b) the conviction of the school administrator of the value of the program; (c) the quality of the professional climate of the school, particularly the flexibility, training, and student orientation of the teaching staff; (d) the availability of funds, facilities, and materials; and (e) the maturity of the program as exhibited by reasonable and well defined objectives, close correspondence between objectives and instructional activity, the training of the reading staff, and its public relations effort with parents, students, and general instructional staff. The intercorrelation of these factors is obvious: the rich get richer.

Although secondary reading teachers imply that lack of administrative support is one of the main deterrents to program development, survey evidence as early at 1940 reveals administrative recognition of the significance of reading programs. Administrators, on the other hand, cite a number of obstacles to the establishment of adequate reading programs: scarcity of trained reading personnel, lack of funds and space, place in the curriculum and/or schedule, and apathy of the general teaching staff. The availability of federal funds in recent years has spurred the initiation and expansion of programs and has helped somewhat in the training of secondary reading teachers. Trained personnel are still scarce, and at this writing, the continuation of federal support must be considered tenuous.

The apathy of the secondary content teacher toward reading efforts has been cited for three decades! Perhaps the content teacher of today is more aware of the generalized nature of reading deficiency among secondary students and even sympathetic toward efforts of improvement—as long as they are not personally responsible for this help. The problem is complex involving issues of occupational selection, preservice indoctrination, ego defensiveness, curricular traditions, and professional training among others. It is apparent that the half-hearted inservice programs which have been typical of the past decade are not coping with the task. It seems equally obvious that those who would sack present special reading program efforts, even those with minimal success, in favor of a singular concentration upon content oriented reading activity, have not realistically assessed the situation which exists in most secondary schools.

Finally, the description, evaluation, and research pertinent to secondary reading programs and their related activities has been lacking in rigor and innovation. As a result, we know very little more about secondary reading instruction and program operations in 1970 than we did one or two decades ago. With a few exceptions, program surveys have failed to provide detailed and carefully defined results. We have no well designed nation-wide survey by which we can accurately guage our national thrust or draw comparative associations with regional and local conditions. We have on record only a minimal number of closely controlled comparative program studies. Certainly we need to challenge our hallowed beliefs about secondary programs. Can they produce results which transfer to the academic and personal lives of students? What does it take to obtain probability of active teacher involvement in content related reading instruction and adjustment? Are total thrust programs a realistic expectation? How do viable secondary reading programs get that way?

In the past three decades, secondary reading programs and related activity have emerged, developed in variety and numbers, and have established a place in the reading literature and research. Now it remains for them to prove their worth through maturity and undeniable evidence of student and school improvement.

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GRADE LEVEL INTERPRETATION OF CLOZE READABILITY SCORES

The purpose of this study[1] was to provide a grade level interpretation for cloze readability scores using a simple technique that can be carried out by classroom teachers. The objective was to study practical methods by which a teacher could use the cloze procedure in evaluating the readability of a passage (or book) and assign to this passage a minimum reading grade level which a student in the class must achieve in order to comprehend the passage. If this can be accomplished without too great an expenditure of time and effort, the use of the cloze procedure for this purpose would have much to recommend it over the use of conventional readability formulae.

In contrast to readability formulae, the cloze procedure measures readability directly from a person, not from material alone. It measures specific contemporary target groups, and thus it need not rely on norms established in the past. It measures readability in relation to a given background of experience and in a motivational context. Unlike many formulae, it is not fooled by long, easy sentences or short, hard words. It assesses langauge correspondence between the author and the target group. It reflects the redundancy in the passage. In so far as factors like organization and subtle elements of style influence comprehension, this is reflected in a cloze score. It has even been found by Rankin and Culhane (1970) that pictures may influence cloze scores. Furthermore, cloze tests are easily constructed and scored, and they do not require complicated statistical manipulations in order to be interpreted.

Many studies—Taylor (1953), Sukeyori (1957), Bormuth (1962), Gallant (1964), etc.—have shown that the cloze procedure is a valid measure of readability. Indeed, it has been used by Bormuth (1969b) as the validity criterion for evaluating other readability measurements. For some time the main weakness of the cloze procedure as a measure of readability was the absence of criteria for interpreting raw scores. The relative difficulty of two or more passages could be determined, but no interpretation could be placed upon the difficulty of each passage. However, Bormuth (1967, 1968) established criterion reference scores for interpreting cloze test scores in relation to conventional multiple-choice comprehension test scores. His 1968 results, which he considers to be the most valid, showed that a cloze score of 44% was comparable to 75% comprehension score (i.e. instructional level) and a cloze score of 57% was comparable to a comprehension score of 90% (i.e. independent level). Rankin and Culhane (1969) replicated this work and obtained essentially the same results using different materials. Thus, cloze test scores may now be interpreted in relation to these conventional reference points in selecting materials for use in the classroom.

It should be noted, however, that these criteria are quite arbitrary. There is no real justification for using these particular percentages as criteria for selection. In another important study, Bormuth (1969a) sought to determine an empirical basis for establishing instructional level. Using "information gain" as a criterion, he found that subjects were able to achieve a maximum amount of information gained by reading materials with a cloze score of 37% (i.e. 65% multiple-choice comprehension). Little more gain was achieved by reading easier materials. He cautioned against ready acceptance of this readability criterion since this study was a preliminary step in the direction of establishing an empirically based criterion for readability. He also observed that students experienced some degree of frustration reading materials at this level. In the present study, all three of Bormuth's criteria will be investigated as standards for comprehension of comprehensibility of materials.

Still lacking in measuring cloze readability is a method to assign reading grade level interpretations to cloze scores. A research technique using regression equations to predict standardized reading grade scores from cloze scores has been used by Bormuth (1969b) to assign grade placement scores to passages. However, this has no utility for the practitioner. The present investigation has studied the results of a "rough and ready" method of assigning grade level scores to passages by relating the grade level reading test scores of the pupils to one or more of Bormuth's criterion reference scores. First, a study was done using an entire class. Second, a preliminary investigation was carried out using a small group of pupils selected on the basis of reading test grade scores.

STUDY I: WHOLE CLASS PROCEDURE

The purpose of this procedure was to determine the grade level readability for several passages by administering cloze tests based upon the passages to an entire class. The study sought to find out what type of results would be obtained by using Bormuth's cloze criterion reference scores and reading grade levels based upon standardized reading tests to determine the grade level readability of several passages. The results of this procedure were compared with the results of several readability formulae.

Subjects: Five classes of public school students in successive grades from four through eight were used as subjects. The average class size was 26. A total of 133 students were involved in the investigation .

Materials: Five articles about birds were chosen from several books on this topic. A 250 word passage for cloze test construction was selected from the middle of each article. In constructing the test, the first and last sentences were left intact. Starting with the second sentence, every fifth word was deleted and replaced with an underlined blank space of fifteen spaces. By this procedure, a 50 item cloze test was produced.

Data Gathering Procedures: Each of five classes was given a different cloze test during the middle of the spring semester. Students were given as much time as necessary to complete the test. The length of time was between thirty and forty-five minutes for all classes. Recent grade level scores were obtained for all students on the Paragraph Meaning sub-test of the *Stanford Reading Achievement Test*. Each 250 word passage was evaluated by both the Dale-Chall and Fry readability formulae.

Analysis: Cloze tests were scored by giving credit for only the exact word that had been deleted. Misspelled words were not counted wrong. The reading grade level scores of students were averaged for those students making cloze test percentage scores of 38, 44, and 58. (38 and 58 rounded from 37 and 57 for this study where each cloze item was worth 2%.)

Results: A comparison of cloze grade level readability scores with those obtained by the Dale-Chall and Fry readability formulae is presented in Table 1.

If the 38% criterion (i.e. 65% multiple-choice comprehension) is a valid one, it can be concluded that the readability of these passages is easier as measured by the cloze procedure than as measured by the two formulae. It may be that 75% comprehension criterion is too stringent. However, more work is needed on the empirical determination of the instructional reading level before we can be sure of the appropriate criterion. In any case, the cloze procedure, unlike readability formulae, can be flexibly adapted to the new criteria as determined by research.

Table 1

Grade Level Readabilities of Five Passages
as Measured by the Cloze Procedure
and Two Readability Formulae

CLOZE TEST AT 38%					
Grade Level of Subjects	4	5	6	7	8
Cloze Test	4.9	5.5	6.3	5.3	6.8
Fry Formula	6	7	7	5	8
Dale-Chall Formula	5-6	7-8	5-6	7-8	11-12
CLOZE TEST AT 44%					
Grade Level of Subjects	4	5	6	7	8
Cloze Test	5.9	5.6	8.8	6.8	7.6
Fry Formula	6	7	7	5	8
Dale-Chall Formula	5-6	7-8	5-6	7-8	11-12
CLOZE TEST AT 58%					
Grade Level of Subjects	4	5	6	7	8
Cloze Test	•	•	•	10.6	8.7
Fry Formula	6	7	7	5	8
Dale-Chall Formula	5-6	7-8	5-6	7-8	11-12

• No scores were obtained at this percentage on these particular tests.

Using the 44% criterion (i.e. 75% multiple-choice comprehension), it is clear that there is a fairly close correspondence between results of the cloze readability analysis and the two formulae. When discrepancies between cloze and formulae results appear, it is believed (for reasons previously given) that the cloze results are more valid. For example, the greatest discrepancy exists between cloze test results and Dale-Chall results for the eighth grade group (i.e. 7.6 cloze versus 11-12 Dale-Chall). In this case, the Dale-Chall results are probably invalidated by the constant repetition of several words like "migration" and "seasonal" which are not on the Dale list. The cloze results are not "fooled" by this factor.

In using the 58% criterion (i.e. 90% multiple-choice comprehension) we can evaluate the independent reading level by using the cloze procedure. This is not possible using readability formulae. For grades four, five, and six, these passages were too difficult for anyone to obtain the 58% criterion. Therefore, using the cloze procedure, we find that the articles are too difficult for independent reading. Most of the formulae results point to the difficulty of these passages for grades four, five, and six, but do not permit a conclusion about independent level. The seventh grade article is apparently suitable for independent use at grade 10. This conclusion differs considerably from the results of the formulae.

In conclusion, it appears that the cloze readability levels using the 44% criterion are not unlike formulae results in most cases, at least for this sample. In atypical groups (i.e. culturally disadvantaged pupils), cloze results could be expected to be considerably different from formulae results. Assessments of independent level can be made with the cloze procedure but not with conventional formulae. Finally, since both the conventional criteria for instructional and independent reading levels have not been empirically determined, the cloze procedure can be flexibly adapted to new criteria determined by careful research.

STUDY II: SMALL GROUP PROCEDURE

Another method involving a small number of subjects to determine grade level readability with the cloze procedure was devised by the writer. This method is called the Informal Cloze Readability Inventory (I.C.R.I.). This technique is patterned after the Informal Reading Inventory devised by Betts (1946). Like the I.R.I., this new technique measures word pronunciation and comprehension. Betts' method uses materials of *known* difficulty to be read by readers of *unknown* reading ability in order to select a book for a given reader. In contrast, the Cloze Informal Reading Inventory uses materials of *unknown* difficulty to be read by readers of *known* reading ability in order to evaluate the readability of a book for a given individual or class. Also, the I.C.R.I. uses the cloze procedure to obtain a more valid measure of comprehension than can be obtained by teacher made questions used in the I.R.I.

Subjects: Six average readers were chosen from classes at various grade levels from four through six in a public school system. At each grade level, three boys and three girls were selected who had Paragraph Meaning sub-test scores on the *Standford Reading Achievement Test* between the 40th and the 60th percentile ranks for their respective grades.

Materials: Three 1,000 word narratives were chosen from three different books for children. A 50 item cloze test was constructed (as previously described) based on a 250 word segment of each passage. The first 150 running words of the 250 word segment was used as an oral reading test. Two comprehension questions were devised for each oral reading test. These questions were not used to measure comprehension, but to establish the proper set for purposeful oral reading.

Data Gathering Procedures: Selected cloze tests and oral reading tests covering the same passages were administed to groups of six pupils at different grade levels. Not all tests were administered to each grade level due to scheduling problems. Each group of six subjects first took a cloze test and then, one week later, each individual pupil read the

150 word passage orally to the teacher and answered the comprehension questions. The time between cloze and oral reading tests over the same passage was used to allow for forgetting. Fry and Dale-Chall readabilities were determined for each article.

Analysis: Scoring of cloze tests was based on the replacement of the exact word which had been deleted. On the oral reading tests, mispronunciations, substitutions, ommissions, pauses, and insertions were counted as mistakes. Mean percentage scores were found for each group on both cloze and oral reading tests. The criterion for instructional level was a 44% cloze score and a 95% oral reading score.

Results: Table 2 shows the mean scores of each group of six average readers who took the test on a particular selection.

Table 2

Mean Percentage Scores for the Informal Cloze Readability Inventory

Selections		Student Grade Level		
		4th	5th	6th
Danger Beneath the Ice	Comprehension %	11		53
	Oral Reading %	90		98
Goliath II	Comprehension %	13	53	59
	Oral Reading %	84	98	95
Penny and the White Horse	Comprehension %			48
	Oral Reading %			98

Visual inspection of the mean percentage scores given in Table 2 shows that a six-grade instructional level was found for "Danger Beneath the Ice" and "Penny and the White Horse." A fifth grade instructional level was found for "Goliath II." The progression of cloze percentages for "Goliath II" from fourth through sixth grades attests to the validity of this technique even though results are based upon a very small sample of six subjects at each grade level. It is interesting to note that this article meets the comprehension criterion for independent reading at the sixth grade level, but fails to pass the oral reading criterion. This illustrates one of the values of this technique over the Whole Class Procedure.

A comparison of the instructional level as determined by the Informal Cloze Readability Inventory with the readability grade levels measured by the Dale-Chall and Fry formulae is presented in Table 3.

Table 3

Comparison of Three Readability Assessments

Selections	Grade Level		
	Cloze Instructional	Fry Formula	Dale-Chall Formula
Goliath II	5	5	4 and below
Danger Beneath the Ice	6	4	5-6
Penny and the White Horse	6	6	4 and below

For these subjects, cloze instructional level was not greatly different from the readability levels as measured by the two formulae. Among these two comparisons, there appears to be a slight tendency for cloze instructional level to place the passages at a slightly higher grade level than the level obtained by the formulae.

In general, it may be concluded that valid readability assessments can be made using the Informal Cloze Readability Inventory based on a small number of subjects. This technique could be modified to select "average readers" based on local norms rather than national norms. If this were done, cloze readability measurements would be more valid in many school systems than estimates or the results of readability formulae. Other percentages related to the conventional independent level or newly established empirically determined readability levels can be used with the Informal Cloze Readability Inventory.

SUMMARY AND CONCLUSIONS

There are several problems related to this investigation which should be noted. First, unless a good, recently normed reading test is used, the results of these methods will be misleading. Second, more work is needed on the problem of cloze sampling. These studies used only one sample of 250 words for each article. Obviously, several smaller samples would be necessary and practical in evaluating an entire book. Third, more work is needed on the interpretation of cloze percentages on materials whose difficulty varies greatly from the reading levels of the readers. Fourth, more research is needed using a larger number of subjects. Finally, it is clear that better readability assessment awaits a definitive empirical determination of both instructional and independent reading level criteria.

In the writer's opinion, the cloze procedure is an excellent technique for assessing readability. In terms of validity, there is good reason for using it as a standard in relation to which other types of readability measurements may be evaluated. The use of cloze criterion reference scores in relation to measured reading grade level greatly enhances the utility of cloze test readability assessments. In the last analysis, readable writing is desirable and important for the reader's sake. If a passage is not readable to an intended reader, it is not readable—no matter how good a formula score it may receive. The reader must be the judge, and the cloze procedure allows the reader to have the last word.

NOTES

[1] I wish to thank graduate students Pamela Murphy and Joanne DeWitt for their invaluable assistance in gathering and analyzing the data for this paper.

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SPECIFIC COGNITIVE FACTORS IN THE READING PROCESS

Although some original research will be summarized briefly at the end, this paper is not intended to be a research report. It is, rather, primarily a theoretical proposal, for which evidence will be adduced from a range of sources both indirect and direct.

NEEDED—A COGNITIVE THEORY OF READING

This paper is directed to the problem of the learning-to-read process rather than the established skill of reading. It postulates that research into visual and auditory perception in reading has been less fruitful than might have been anticipated from the commonsense view of what reading obviously is, and that, therefore, it may be more profitable to turn to the less obvious or invisible cognitive aspects of learning to read. Such underlying cognitive factors may be much more important than the surface ones of visual and auditory perception.

More precisely, it is postulated that the task of mastering the skill of reading poses a very complex problem to be solved by the child. Thus the learning-to-read process may consist in a series of discoveries of solutions to the sub-problems which constitute the total complex problem of finding out how to read. In other words, progress in learning to read is made by a series of cognitive restructurings which result from probes made by the learner in his search for solutions. Sometimes the new cognitive structure will be a correct solution, but at other times it will be in error. As the child's attempted solutions approximate more and more closely to the reality of each aspect of the reading process, so he will achieve more and more *cognitive clarity*. The best measure of a child's progress in solving the learning-to-read problem, therefore, should be his degree of understanding of the nature of the task. Thus cognitive clarity will be correlated most highly with reading success, while failure in reading will have as its chief symptom, *cognitive confusion*.

Indirect evidence for this cognitive clarity viewpoint may be considered under two headings; (a) evidence from studies of reading disability; (b) evidence from studies relating reading achievement to various intellectual abilities.

STUDIES OF READING DISABILITY

Vernon's (1957) monumental review of the causes of failure in learning to read led her to conclude that "there may exist different types of reading disability, produced by different factors, and different complexes of factors, in different cases." So much so that "almost the only fact which appears clearly at first sight is the heterogeneity of cases of reading disability—heterogeneous both in the origin and in the nature of the disability. But there does seem to be one fairly universal characteristic of the disability, namely, the child's general state of doubt and confusion as to the relationship between the printed shapes of words, their sounds and their meanings. This confusion resembles that of a young child who is just beginning to read."

This final sentence by Vernon triggers off the present theoretical proposition. Vernon expands the idea further, as follows:

> We may conclude that, rather than suffering from some general defect in visual or auditory perception, imagery or memory, the child with reading disability has broken down at some point, and has failed to learn one or more of the essential processes that we have described. He therefore remains fixed at a particular point and is unable to proceed further.

In these two quotations from her extensive review of research on reading failure, Vernon provides evidence on two points: The important common symptom of confusion regarding the nature of the task; and, This symptom is reminiscent of the attitude of young beginners.

Vernon actually uses the term "cognitive confusion" to describe this pervasive symptom of reading disability: "Thus the fundamental and basic characteristic of reading disability appears to be cognitive confusion."

She defines this state, as follows:

> The child with real reading disability . . . may indeed have learnt that printed words have some relation to spoken words; and, with a few simple words, he has memorized the spoken word that corresponds to a particular shape. But he does not seem to understand why: it might be quite an arbitrary associa-

> tion. He appears hopelessly uncertain and confused as to why certain successions of printed letters should correspond to certain phonetic sounds in words.

Vernon further found that "to make this association demands a particular type of reasoning process," and that, in reading disability "the fundamental trouble appears to be a failure in development of this process", so that the disabled reader "remains in a state of confusion over the whole process."

Relating Vernon's conclusion to the present theoretical proposition, if cognitive confusion in the particular type of reasoning process involved in learning to read is the outstanding feature of the disabled reader, then, conversely, cognitive clarity ought to be the most prominent characteristic of the normal reader. The normally developing reader should understand why the written and spoken forms of language are related as they are. He should progress towards a clear understanding of why certain successions of printed letters should correspond to certain phonetic sounds in words, and Vernon's "particular type of reasoning process" should be observable in developmental stages beginning with the normal cognitive confusion of the earliest stage through a series of problem-solving phases to a later stage of normal cognitive clarity.

STUDIES OF INTELLECTUAL ABILITIES IN READING

Further indirect evidence for this cognitive clarity theory may be adduced from the common finding of a rather high correlation between intelligence and reading achievement. Success in problem-solving is a measure of intelligence, and, obviously, therefore, intelligence determines to an important degree the child's success or failure in solving the problems of finding out how to read. Vernon (1957) states, "It is clear that these processes are in themselves excessively complicated, and require a considerable degree of intelligence and insight." Tinker (1932) concluded that general intelligence is the most important factor in determining the student's progress in learning to read. Thackray (1970) in England and Malmquist (1970) in Sweden both recently have completed studies confirming the high correlation between intelligence and reading achievement. For example, Malmquist's conclusion is:

> The relation was of such an order of magnitude that it definitely confirms the almost unanimous view expressed by previous investigators that intelligence is an important factor in the development of reading ability.

Nor does the finding that correlations between reading achievement and auditory or visual discrimination are higher than between reading achievement and intelligence invalidate the evidence adduced in the preceding paragraph. For one thing, the studies which found this, e.g., Durrell, Murphy, and Junkins (1941), Harrington and Durrell (1955), Nicholson (1958), Thackray (1970), indicated only very small differences in the correlations. Secondly, visual and auditory discrimination are, to a very important extent, *learned* abilities, which may have a substantial cognitive element. For example, learning to read in English, Finnish and Japanese all require discrimination learning of both types. Children in Finland or in Japan, no less than children in England or America, must learn to discriminate the particular sounds of their languages even though they have quite different phonological systems. They must also learn to discriminate between the particular graphemes of their languages even though these are quite different visual stimuli to those which exist in the English writing system. The grapheme-phoneme relations in Finnish are less confusable than those in English. Likewise, the Japanese Kana syllabary provides a more consistent system at a simpler level. Thus this particular aspect of problem-solving in learning to read is likely to present less difficulty in either Finnish or Japanese than it does in English. Thus one would predict that cognitive clarity in respect of the problem of the relations between written and spoken symbols would be facilitated in children learning to read in Japan and Finland as compared with children in the English-speaking countries. Recent articles by Sakamoto and Makita (1971) on reading in Japan and Kyöstiö (1971) on Finnish reading behavior state that reading disability is not a recognized problem in either Japan or Finland, whereas it is a source of great public concern in, for example, the United States and Britian. Since it is extremely unlikely that Finnish or Japanese children are twenty times better equipped morphologically, neurologically, physiologically, psychologically or in genetic influences, one must look for differences in the *experiences* of children learning to read in these different nations, the most remarkable of which are those which arise from the very different writing systems of the languages of these countries. These different experiences are likely to result in differences in specific cognitive factors beneath the surface of auditory and visual discrimination sub-skills. These could explain not only the national differences in the incidence of reading disability but also the correlations discovered by Durrell *et al* and the other investigators quoted earlier.

They may also explain what might be called the "Sesame Street" effect of the correlational finding that letter-name knowledge in kindergarten is the best single predictor of first grade achievement in reading, Nicholson (1958), Olson (1958), Gavel (1958), Barrett (1965), de Hirsch *et al* (1966), Bond and Dykstra (1967), and Dykstra (1967). This produced the correlation fallacy expressed by Chall (1967) as follows: "knowing the names of the letters before learning to read helps a child in the beginning stages of learning to read, whether he learns from an approach emphasizing code or meaning." Three independent experimenters, Johnson (1970), Samuels (1958), Ohnmacht (1969), all found that teaching letter-names has no effect on reading achievement. For example, Samuels' results led to his conclusion "that letter-name knowledge does not help the student learn to read."

Clearly some other factor or factors is responsible for the correlation between early letter-name knowledge and first grade reading achievement. Both could be a reflection of the same underlying factor, e.g., cognitive clarity in respect of such linguistic categories as the grapheme. As Piaget (1959) has pointed out, "Verbal forms evolve more slowly than actual understanding." Hence, letter-name knowledge in kindergarten is probably a symptom of an early phase in the growth of cognitive clarity. Conversely, the findings of Johnson, Samuels, and Ohnmacht that training in letter-name knowledge is ineffectual fits well with Vygotsky's (1962) generalization:

> Direct teaching of concepts is impossible and fruitless. A teacher who tries to do this usually accomplishes nothing but empty verbalism, a parrotlike repetition of words by the child, simulating a knowledge of the corresponding concepts but actually covering up a vacuum.

RESEARCH ON CHILDREN'S THINKING

Just as an over emphasis on perception has diverted attention from cognitive factors in reading, so also has there been a corresponding relative neglect of *categorizing behavior in reading* in comparison with the mass of studies on discrimination. As Bruner *et al* (1956) have pointed out, "Virtually all cognitive ability involves and is dependent upon the process of categorizing." The importance of this aspect of cognitive behavior in reading has been hinted at by only a few studies. For example, Solomon's research as reported by Robinson (1953) found that the only predictive result of a Rorschach Test was the undue concern with unimportant details shown by some of her 8 year old subjects. These children were more likely to fail in reading. This seems a surprising result in view of the emphasis usually placed on *discrimination* in learning to read, but it would be less unexpected if this finding were related to the importance of *categorizing*.

More recently Serafica and Sigel (1970) have reported a complete study of "Styles of Categorization and Reading Disability," which is a substantial contribution to research on cognitive factors in learning to read. Of particular interest, in connection with this theoretical discussion of cognitive clarity in reading is their conclusion that:

> The boys with reading disability in this study do not seem lacking in an analytic ability. If the initial phase of learning to read requires differentiation of graphic symbols from one another,

> the non-readers were better equipped for that task than were the boys who showed no reading problems.

Again, this result is surprising only if discrimination is regarded as the fundamental sub-skill of reading.

More direct evidence that categorizing behavior is of greater importance in learning to read than has hitherto been recognized is provided by the research of Reid (1966) and the present author's replication of her work–Downing (1970b). Reid found that young beginners in a school in Scotland displayed much confusion in their use of such categorization terms as "word," "letter" and "sound" which are important in talking *and thinking* about the task of learning to read. This finding was confirmed in Downing's replication using young children in the south of England.

DIRECT EVIDENCE OF THE IMPORTANCE OF COGNITIVE CLARITY IN THE LEARNING-TO-READ PROCESS

Most of the direct evidence which can be cited consists in those findings of empirical research which have inspired this cognitive clarity theory of reading. Only recently have experiments begun to test hypotheses derived from the theory. As all these data have been published or are in the process of getting published already, and because space here is limited, they will be presented only in the form of a summary list of findings with their references to the original source of the data.

1. The young beginner's categories of spoken "word" and speech "sound" do not correspond with those of an adult. Downing (1970b).
2. The young beginner's category of written "word" does not coincide with that of an adult. Meltzer and Herse (1969), Downing, Evanechko and Ollila (1970d).
3. Young beginners do not know the purpose of written language Reid (1966), Downing (1970a), Vygotsky (1962).
4. Learners of reading demonstrate "a sequence in the development of the concept of word boundaries" (i.e. the category "word"). Meltzer and Herse (1969).
5. Five specific dimensions of growth in cognitive clarity in reading have been discerned in children as they progress in their first year at school:
   (a) "Understanding the communication purpose of the written form of language."
   (b) Attaining "the concept of visual symbol."
   (c) Attaining "concepts of abstract parts of spoken language."
   (d) Learning the "technical vocabulary of language learning."
   (e) "Understanding the decoding process."
   Downing (1970b, 1970c).

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DEVELOPMENT OF SPECIFIC READING SKILLS IN ADULT EDUCATION

In this paper a rationale for a skill development focus in Adult Basic Education (ABE) reading classes is presented and a list of essential reading skills is suggested. An empirical validation of a skill-centered approach is reported to support the notion that instruction in specific reading skills will raise the level of general reading achievement.

Rationale for a Skill Development Focus

Adults come to an ABE class with varied backgrounds, experiences and abilities. They probably have had some formal schooling and have some ability to read, however limited. A few reading skills, such as the ability to recognize certain common words at sight, may be relatively well developed while others, such as structural analysis skills, may not.

The ABE instructor is thus faced with the challenge of making the reading class interesting to adult students of varied backgrounds and abilities. Furthermore, if adult students are not provided with some evidence of instant success, they may not be back for the next class session. The real challenge, then, is to provide adult students with the tools that will enable them to read independently as soon as possible. Adults are usually not willing or able to wait five years before they become able to function at a level of minimal literacy.

In response to this challenge, ABE instructional materials have frequently employed the sentence approach to teaching reading in an attempt to provide some demonstration of instant success. On the other hand, instruction in specific reading skills has been delayed and generally not emphasized on the assumption that adults would find that approach tedious and unrewarding. The problem with such a view-point, however, is that many adults do not develop the skills necessary for truly independent reading. While they may experience success at first, too often they remain unable to progress to more difficult reading material because they lack the means to unlock words that have not been directly taught to them.

Suppose, then, that an ABE instructor is convinced of the need to teach reading skills while using adult content. He faces a very real problem because in all likelihood every adult in his class has a different set of skill development needs. We feel that the best way to tackle the problem is to start with a list of reading skills which are considered to be essential to successful reading. Then, using the skill list as a framework, the teacher can assess the skill related behaviors of individual students to determine which of the specific skills each student lacks and which he has mastered. Finally, the teacher can provide instruction that is focused on deficits, for if instruction is to be meaningful to each student, it must be directed specifically to his particular needs.

A basic problem with such an approach may be to find an adequate list of skills to use as the basis for a skill development program. As mentioned earlier, present instructional programs in ABE are rarely systematic in developing specific reading skills and usually they do not provide a scope and sequence statement of the skills that are taught. Therefore, a list of essential reading skills with historical and consensual support is suggested in the next section of this paper. Given such a list the skill development status and progress of adult students may be monitored regardless of the instructional materials used.

WORD ATTACK SKILLS

A scope and sequence statement of word attack skills is presented in the Appendix. Only word attack skills are dealt with here although similar procedures could be followed for other areas of reading such as comprehension and study skills.

The list of word attack skills is from the Wisconsin Design for Reading Skill Development (1970), a skill-centered program for the elementary school. There is no reason to believe that the reading skills essential for beginning adult readers are different from those required by children. The reading skills that serve as a basis for the Wisconsin Design have the consensual support of teachers, reading consultant, and researchers. In developing the list, we started with a good public school curriculum guide and then refined it over a period of several years on the basis of feedback from tryouts and developmental efforts in the schools.

The present list of word attack skills, then, may serve as the basis for a reading skill development program. Behavioral objectives have been written to specify the criterion behaviors needed to demonstrate skill mastery. Workers in ABE could devise assessment tests with adult content by using the skill list as a base and the behavioral objectives as guides for examining skill related behaviors. Group and individual assessment tests, keyed to the skills in the outline, already exist as components of the Wisconsin Design. These tests, although intended for children, could be modified for use in assessing the skill development of adults.

After an adult student's skill development status has been determined, the instructor is in a position to provide instruction designed to remedy specific weaknesses. By knowing the level on which the adult is functioning and his specific skill deficits, the instructor may identify materials that are appropriate for each individual student. Instruction can thus became meaningful to each student, especially if he is shown his skill development profile to illustrate his specific strengths and weaknesses.

The assumption underlying this approach is that instruction in specific skills in which the student is deficient will raise the level of his general reading achievement. The validity of this assumption is examined in the next section.

Relationship of Skills and General Reading Achievement

Teaching specific reading skills, such as those listed in the Appendix, may be considered a valid approach to reading instruction if students' attainment of the skills is directly related to their level of general reading achievement. This relationship was explored by administering the group tests from the Wisconsin Design for Reading Skill Development to children in Grades 1-6. Although the data presented in this section are from children's test results, support for a skill-centered approach to reading instruction would serve as general evidence of the validity of the approach.

Method and Analyses

Scores on standardized reading achievement tests (Table 1) were obtained from the regular fall testing program of a school using the Wisconsin Design. At the same time the students were also given the Wisconsin Tests of Reading Skill Development: Word Attack.

A subject was assigned a score of 1 on a word attack subtest if he answered 80% or more of the items correctly or a zero if he answered fewer items correctly. These scores were added across all subtests to yield a mastery level score for each subject which indicated the

Table 1
Wisconsin Design and
Standardized Reading Achievement Tests Administered

Grade	Wiconsin Tests of Reading Skills Development	Standardized Reading Achievement Tests
1	Level A	Metropolitan Readiness Tests
2	Level B	Stanford Achievement Test, Primary I
3	Level C	Stanford Achievement Test, Primary II
4	Level D	Stanford Achievement Test, Intermediate I
5	Level D	Stanford Achievement Test, Intermediate I
6	Level D	Stanford Achievement Test, Intermediate II

number of word attack subtests he passed at a given level. Thus, a given mastery score of, say, 1, where the highest possible is 7, meant that the subject mastered any one of seven subtests and that different subjects could have the same mastery score without being proficient in the same specific skills. Thus, the method of scoring and analysis assumed that all skills were of equal importance.

Since the school in the study was non-graded–organized into units by age groups rather than by traditional grade levels–the data were analyzed by unit as well as by age-grade equivalents. The data for each group were analyzed by multivariate analysis of variance to determine the regression of the standardized test scores on the mastery level score –the number of skills mastered at a given level. Orthogonal polynomials were used to isolate the various components–e.g. linear, quadratic, cubic, etc.–of the curves.

The first step in the statistical analysis was to test the non-directional null hypothesis that there was no relationship between general reading performance and mastery level using multivariate analysis of variance. If this hypothesis could not be rejected by the evidence from the data ,using an F-test requiring significance at the .05 level, there would be no need for further analysis as the model would be totally without empirical support. Otherwise, the next step would be to determine if the relationship were "positive". A statistical test was thus made of the hypothesis that all components of higher order than the quadratic component were zero. If this hypothesis could not be rejected, it would be inferred that the relationship was well approximated by a curve with just linear and quadratic components.

Results and Interpretations

Results of the test of the hypothesis of no relationship between mastery score level and general reading performance by grade and unit are shown in Table 2. The probabilities of observing F-ratios as large or larger than the ones actually observed if the null hypothesis were true are shown in the first row of Table 2 labeled "Linear and higher components." The null hypothesis must be rejected in every case. A statistically significant relationship between word attack mastery level and reading performance as measured by general tests was found at all grade levels.

Table 2
Multivariate Analysis of Variance
for Regression of Standardized Reading Scores
on Skill Mastery Level by Grade and Unit

Source[a] (Components of Function of Mastery Score)	Significance Levels Grade/Unit 1/A & 1/B	2/C	3/C	3/D	4/D & 5/E	6/E
Linear and higher components	.002	.0001	.02	.0001	.0001	.0001
(Linear only)	(.002)	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
2nd Order and Higher	.44	.015	.76	.20	.41	.75
(Quadratic only)	(.17)	(.19)	(.27)	(.02)	(.92)	(.58)
3rd Order and Higher	.60	.002	.82	.44	.26	.69
Number Dependent Variables	5	4	3	3	2	2
Df for Error per Depend. Var.	61	46	21	38	149	57
Number of Skill Levels	7	11	10	14	7	7

[a] The various sums of squares (SS) used for the tests are not mutually exclusive as the SS for each major entry are included in the entries above it. The SS for the entries in parentheses are included in all major entries above.

The next step was the determination of the direction of the relationship. The relationship was found to be positive in that as mastery of specific skills increased so did reading performance. However, at Grade 2 the relationship appeared to be complex and reading performance did not always increase as mastery level increased. If one were to compare results between grades it would appear that the relationship noted above becomes more pronounced, or in simpler form, as grade increases. This may reflect the fact that at the earlier grade levels general reading ability is less developed and reading scores may reflect many other variables. Or, it may be that it is more difficult to obtain reliable estimates of reading ability at the lower grade levels. Or, perhaps, this is the result of the particular selection of tests used at each grade level. A more detailed explanation of the analyses and results may be found elsewhere. (Fischbach, 1971).

Since general reading level—as measured by standardized reading achievement tests—increased with the number of skills mastered at a given level, the validity of a skill-centered approach to reading instruction is supported. Thus, it appears that instruction in specific reading skills can serve to raise students' general level of functioning. This empirical support for the basic assumption underlying the Wisconsin Design is, to the present writers, sufficient encouragement to continue with the development of a skill-centered system.

CONCLUSION

While the need to pay attention to the individuals involved in ABE classes may be quite obvious, the fact is that more often than not the individual is forced into a pre-selected program and treated as if he were a member of a homogeneous group. We have suggested that a skill-centered system of reading instruction would permit ABE teachers to do a more efficient, realistic job of teaching reading to adults with widely varied backgrounds. More specifically, we have suggested that the model provided by the Wisconsin Design for Reading Skill Development might be adapted for use in ABE. Essential skills are not likely to be very different for adults than for children, so modifications in format and wording of certain tests may be the main requirement in shifting from an elementary school to an adult program context. Preliminary data offer encouraging empirical support for a skill-centered approach to reading instruction.

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ASKOV, OTTO, AND FISCHBACH: APPENDIX
Wisconsin Design for Reading Skill Development
Outline of Reading Skills
Word Attack

LEVEL A

1. Listens for rhyming elements
   a. Words
   b. Phrases and verses
2. Notices likenesses and differences
   a. Picture (shapes)
   b. Letters and numbers
   c. Words and phrases
3. Distinguishes colors
4. Listens for initial consonant sounds

LEVEL B

1. Has a sight word vocabulary of 50-100 words
2. Follows left-to-right sequence
3. Has phonic analysis skills
   a. Consonant sounds
      1. Beginning
      2. Ending
   b. Consonant blends
   c. Rhyming elements
   d. Short vowels
   e. Simple consonant digraphs
4. Has structural analysis skills
   a. Compounds words
   b. Contractions
   c. Base words and endings
   d. Plurals
   e. Possessive forms

LEVEL C

1. Has a sight word vocabulary of 100-170 words
2. Has phonic analysis skills
   a. Consonants and their variant sounds
   b. Consonant blends
   c. Vowel sounds
      1) Long vowel sounds
      2) Vowel plus *r*
      3) *a* plus *l*
      4) *a* plus *w*
      5) Diphthongs *oi, oy, ou, ow, ew*
      6) Long and short *oo*
   d. Vowel generalization
      1) Short vowel generalization
      2) Silent *e* generalization
      3) Two vowels together
      4) Final vowel
   e. Common consonant digraphs
3. Has structural analysis skills
   a. Base words with prefixes and suffixes
   b. More difficult plural forms
4. Distinguishes among homonyms, synonmyms, and antonyms
   a. Homonyms
   b. Synonyms and antonyms
5. Has independent and varied word attack skills
6. Chooses appropriate meaning of multiple meaning words

LEVEL D

1. Has a sight word vocabulary of 170-240 words
2. Has phonic analysis skills
   a. Three-letter consonant blends
   b. Simple principles of silent letters
3. Has structural analysis skills
   a. Syllabication
   b. Accent
   c. The schwa
   d. Possessive forms

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DIAGNOSIS AND PREDICTION OF READING PERFORMANCE AT THE ADULT LEVEL

Good pedagogy, whether related to the teaching of reading or any other subject, has always recognized the value of diagnosis. To test, teach, and then re-test has become standard instructional practice simply because of its obvious utility; until we know where we are, it's impossible to know what steps should be taken to lead us to where we'd like to end up. Most testing practices, however, have been developed to fit the needs of teachers working with young children. Much of test-data, in fact, has traditionally been perceived as teacher or school property, semi-secret information intended primarily for teacher guidance and either too volatile or too incomprehensible for direct pupil or parent consumption. One needn't look far into the past literature of our profession to find raging controversies over just how—or sometimes even whether at all—students, parents, or other "lay" persons could or should be apprised of individual and/or group pupil-progress. When built upon models of teacher-student relationships characterized by well-trained, adult teachers and pliant, immature pupils, such views are understandable, perhaps under some conditions even defensible. When dealing with adult learners, however, the picture changes.

CHARACTERISTICS OF ADULT LEARNERS

For one obvious thing, of course, adults are different simply because they are adults, generally able to understand the language of diagnosis and more able than children to observe their own situations in relation to others'. This means that adults can be dealt with more openly, objectively, and candidly than can children.

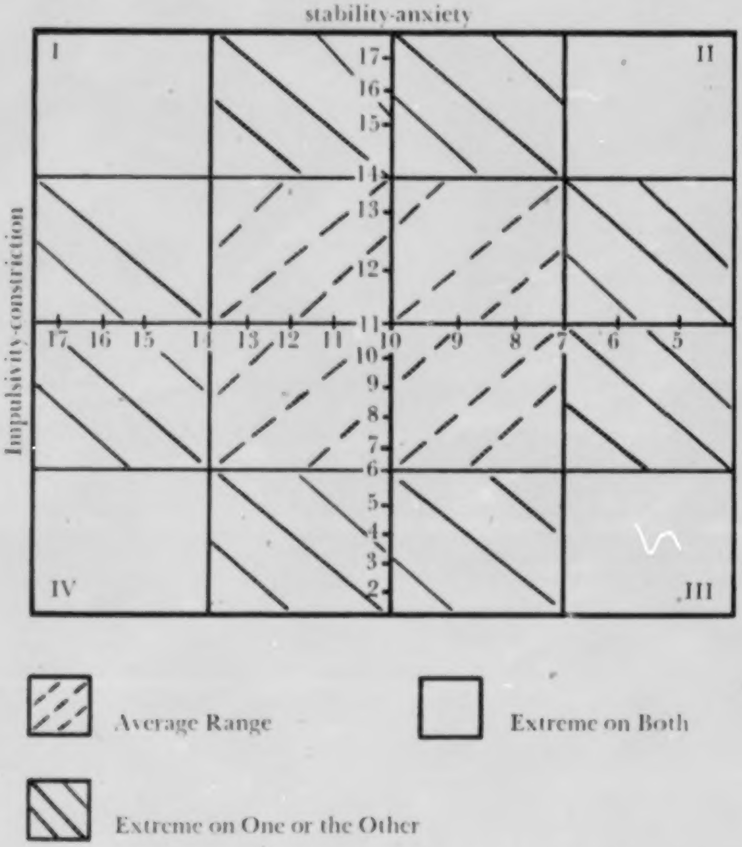
Beyond this, however, adults are also different because they've lived a lot longer, another way of saying that they are already much more what they're going to be psychologically, socially, and intellectually than are young children. Thus, the adult learner who comes to a reading class brings with him a good many relatively set patterns of behavior. Whatever steps we take to change or alter these patterns will of necessity be adaptive, not total. Much as we'd sometimes like to, we're rarely going to completely reverse a student's life-style or substantially substitute our own values, ideals, and aspirations for his. Generally speaking, the improvements made in adult learner's reading, academic aptitudes, and/or intellectual-cultural involvements will be built-upon, not substitutive for, his own current cognitive style, his own current aspirations and interests, and his own current view of himself and his relationship to the world of words.

Recent research in adult educational diagnosis has tended to shift from what Wark (1965) called "Dean Data"—progress report information about incoming and outgoing performances of groups—or what we might designate as "Norm Data"—searches for larger and larger pools of base-line information. Research has shifted to the study of individual self-concept, personal self-expectations, and the inter-relationships between idiosyncratic cognitive styles and concomitant personality variables as they affect learning. Thus, diagnostic instruments and techniques incorporating analyses of individual learning styles with opportunities for applying the results of these analyses to realistic learning tasks would appear to be much more productive and useful than are simple assessments of survey data like overall rate, general comprehension level, and the normative appraisal of recognition-level vocabulary.

THE SMITH TEST OF LEARNING STYLE

Viewed in these terms, the Smith Test of Learning Style (1961) appears to be an extremely valuable tool for adult diagnosis. Four dimensions of individual personality are measured in interaction—impulsivity, constriction, stability, and anxiety. The resulting profile is then related to the strengths and weaknesses of an individual's personal learning style when approaching different academic tasks. Smith's Learning Style Graph is shown in Figure 1. The impulsivity-constriction continuum is essentially a learning style and/or reading style dimension. The stability-anxiety continuum is essentially a personality variable. Both sources are graphed simultaneously, with the inferences to be drawn taken from the particular quadrant or quartile in which the student's combination of scores places him. Quadrant I represents high scores in both Impulsivity and Stability; quadrant II, high in Stability but low in Impulsivity; quadrant III, low in both Impulsivity and Stability; and quadrant IV, high in Impulsivity but low in Stability. For learners at the extremes of the paired scales, the following descriptions apply: (Modified from Smith, p.11)

Figure 1. Learning Style Graph (After Smith, 1961, p. 12)


stability-anxiety
Impulsivity-constriction
I
II
III
IV
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
17
16
15
14
13
12
11
10
9
8
7
6
5
▨ Average Range
☐ Extreme on Both
▧ Extreme on One or the Other

Quadrant I. This person's impulsivity will be illustrated by his difficulty or even inability to focus carefully on one idea. Thus, his themes will tend to be rich in ideas but poorly developed in structure. His inadequate attention to details will often lead him to difficulty in understanding examination questions: important qualifying words may be missed; he may jump to conclusions too quickly. His memory for foreign languages or mathematical formulas will probably be poor. To him, learning is getting acquainted with the big picture. He sees the forest, but may fail to note significant single trees.

Quadrant II. This person's constricted thinking will probably be illustrated by the sparse content of his themes. One idea may be spelled out at length, but in a pedestrian, narrowly-conceived way. A less common problem of the constricted thinker is a tendency to focus only on details to the point that important generalizations are shorted or even missed. His reading often tends to be slow, with undue attention paid to single words, and an inadequate overall comprehension of thematic ideas. To him, learning is the memorizing of lists, formulas, and verbatim definitions. He rarely fails to note a single tree, but his range of vision may fail to take in the full forest.

Quadrant III. The worries of this person make concentration on academic tasks difficult. He may also have a tendency to blame others for his troubles, particularly current and past instructors. Thus problems with interpersonal relationships may commonly intensify this type of person's poor academic adjustment.

Quadrant IV. When tension is added to impulsivity, the result is often a disorganized, overly-dependent person who is unable to tolerate stress. Examination panic is common among such individuals. Both attention to and memory for details may be seriously deficient. On the positive side, such persons may tend to produce original ideas easily.

ADULT LEARNERS AND LEARNING STYLE

One area of concern to adult learners where these admitted genearalizations (and perhaps even over-simplifications) can be of direct, immediately applicable help is in terms of study skills. In particular, quadrants I and IV people (high in Impulsivity), differ from those falling in quadrants II and III (low in Impulsivity).

Groups I and IV. Smith notes:

> Individuals who are extreme in extraversion and impulsivity tend to profit more from a systematic study procedure than do those in Groups II and III. . . . They are "at home" with unsystematized knowledge and enjoy an opportunity for trading opinions. Their knowledge is held loosely, and new ideas are welcomed. They tend to be impatient with memoriter tasks, with working problems, and with knowledge which is fixed or static. They have a fertile and relatively undisciplined imagination, seldom having trouble thinking of ideas for themes or new approaches to old problems.
>
> On the negative side, Groups I and IV have difficulty memorizing material. They tend to forget quickly, to remember irrelevancies, to see relationships which do not exist. They tend to confuse text statements with their own opinions. Their

> themes are often disorganized, main idea arousing main idea, ad infinitum, with no single idea being developed adequately. They learn less and less about more and more. (p.78)

For such a person, the imposed discipline of a structured study system like SQ3R or OK4R can be of aid, particularly the latter steps. By forcing himself to read carefully to answer precise questions and then checking the answers to these questions against the test of concrete recitation, this type of person is slowed down in his mad leaps from main idea to main idea and forced to confront detail. As noted above, his knowledge is often held together quite loosely (perhaps because he's acquired it in such an undemanding, carefree way). It needs to be regularized, ordered, and formalized for good absorption and retention. Though this type of individual may at first reject the formalism of a rigid "system," he must be encouraged to try one. With time and practice, he'll usually adopt or adapt, and gradually it will temper his entire learning style.

Groups II and III.

> At the other extreme "are the highly systematic, perfectionistic, well-disciplined individuals who lean toward systematized learnings, who memorize easily, and who tend to value things more than social interaction.... Right is right and wrong is wrong: right and wrong are clearly not a matter of opinion. For these individuals, mathematics and the periodic table of chemistry are no problem. Even foreign language tends to be easy.
>
> On the negative side once more, such people learn more and more about less and less. They have difficulty developing new ideas, and lean towards authority for the answers to their problems.... Their themes tend to be well-organized but lifeless. They tend not to think by analogy, and thus fail to detect the figurative language in literature; they distrust emotion as a basis for thinking, and therefore, distrust the language of literature. Perhaps the most serious problems of the constricted thinker are those stemming from his inability to see relationships. His lecture notes make no sense: they consist of a series of details with no larger meaning. He knows the operations in trigonometry, but doesn't know when to use them in solving a problem. (pp. 78-79).

For this reader, too, the SQ3R or OK4R format can be of help, but with the emphasis placed upon the initial and final steps. By forcing himself to survey the entire selection or lesson *before* mastering the parts, the learner is encouraged to keep the whole-part relationship in mind as he proceeds through the total selection. As a check against compartmentalization, he should be urged to continually ask and re-ask himself the question, How does this relate back to the big idea?

The final review step serves as his ultimate measure of how well he's retained the integrity of the whole.

PREDICTION OF THE ADULT PERFORMANCE

But what now of prediction? Of what use is this type of diagnosis beyond simply parceling out the goats from the sheep, the dilettantes from the dreary drudges (and perhaps suggesting some possible strategies for nudging both groups inward towards some Golden Mean)? The most obvious use of such information, of course, is in counseling with students as yet unsure of their strengths and weaknesses and as yet uncommitted towards any particular major or academic program. Certainly students of types II and III will be far happier and more successful in mathematics, accounting, physics, or chemistry than in the humanities or the social sciences. Since the exact sciences provide the kind of definiteness consonant with their kind of temperament, they should at least be apprised of that fact. Though we as individuals might often really like to mellow them a bit, as instructors and counselors our ethical duty is clearly to give them straight answers to their questions of "In what academic or vocational area would I probably do best?"

For types I and IV, too, the directions of strength are clear. All else being equal, such individuals will probably be much more at home in the social, rather than the "hard," sciences. With less ego-involvement in their held knowledge, they'll probably be more comfortable with the shifts of viewpoint, the uncertainties, and the inexactitudes they'll face there than with the rigidities and convergencies encountered in the natural sciences.

In terms of reading specifically, predictions are also possible. Types I and IV, our experience has indicated to us, are good candidates for speed-reading. They acquire general vocabulary rapidly and easily, and are capable of becoming highly-skilled, rapid readers in a very short time. Their very strengths are their danger-points, however, and care must be taken not to overly reinforce their natural haste to the point of encouraging superficial reading only. During practice sessions, they should be kept honest by frequent comprehension-checks, particularly of detail.

For types II and III, speed, *per se* will be an elusive goal. Because of their characteristic respect for accuracy of detail, they'll probably resist fast reading and need to have lower goals set as far as pure words-per-minute measures are concerned. The best approach towards flexibility for these persons is through extensive practice at surveying or skimming. Given a precisely defined "label" for perusing print more rapidly than usual, they can often learn to pick up a good deal of information from a minimum of cues without substantially sacrificing their criteria for what the term "reading" means to them. Hopefully, then, some of this increased rate will eventually rub off onto their general rates.

SUMMARY

The following points have been dealt with: (1) adult reading and learning diagnosis has been contrasted with that more appropriate for working with young children, (2) a learning style-centered approach has been suggested, and (3) the strengths of the Smith Learning Style Test in particular have been cited. (4) The use of this instrument for diagnosis and prediction has been explored in some detail, and (5) implications for ameliorative practices have been at least touched upon. Procedures for diagnosis and prediction of reading performance at the adult level are indeed different from those used at the younger reader level. Procedures should combine encouragement of the adult's capitalizing upon his characteristic strengths with simultaneous attempts as compensating for his weakness.

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MAKING ADULT READING PROGRAMS TRULY ADULT

In Wisconsin, and probably in other states, too, there still exists a shortage of reading teachers with special training in adult education. Teachers of adult reading are often recruited from the ranks of secondary school, or even elementary school, reading teachers.

Unfortunately, these teachers are not always as effective in their work with adults as they have been in their work with younger students. Though highly competent in their knowledge of reading and reading instruction *per se,* their training and teaching experiences simply haven't prepared them for the particular problems the adult learner presents. As a result, they often come to us at the university for help. "Why," they ask, "aren't my previously successful methods working? What's different about an adult who needs help in reading?"

The guidelines that follow have been developed in an attempt to answer the question of how adult learners differ from children with essentially the same reading problems. They have been derived from several sources: guidebooks and handbooks prepared by authorities in adult education, the recommendations and suggestions of particularly successful teachers of adult reading, the evaluations and comments of students in adult reading courses, and the personal teaching experiences of the authors and many of their colleagues.

In particular, these guidelines are meant for the teacher who works with a type of adult learner we're seeing more and more of: not the professional who wants rate-training or the college student who wants study-skills, but rather the high-school graduate or dropout who enrolls in an evening extension or technical school reading course for general reading improvement. This reader differs from his professional or student counterparts in certain specific ways, and each must be taken into consideration if his experiences in adult reading instruction are to be productive.

First of all, even his basic reading skills are often deficient. This means that word-attack strategies and general comprehension skills are much more important to him than are rate-building or the acquisition of sophisticated vocabulary. Next, the decision to seek help in reading has often been a difficult one for him to make. Re-entry into a world where his past experiences have often been unsuccessful takes courage and commitment. In fact, many of these adults begin a reading course unduly fearful of failure. Finally, these students often have poor general self-concepts. In many cases, not only is their reading ability low, but so are all their other academic and educational skills. These are some reasons why the teaching of reading to certain adults is such a challenge, and this is why the following guidelines have been developed.

PROVIDE A PHYSICAL SETTING APPROPRIATE FOR ADULTS

Learning to read is generally considered to be the business of children. Adults may be embarrassed about receiving reading instruction and need continual visible assurance that they are indeed in a program for adult learners. One way to provide this assurance is to arrange for an instructional setting that is clearly different from the setting provided for younger learners.

In some communities it is possible and desirable for adult reading classes to be held in buildings other than the local elementary or high schools. However, it is often more practical to hold adult classes in the same rooms that younger students occupy at other hours. When the same classrooms are used, they should be modified to reflect adult interests and needs. Some portion of the bulletin board space should be reserved for the adult classes, chalkboards should be erased, and seating arrangements should be circular or rectangular. In so far as possible the adult learners should be given the feeling that this is their classroom. They should never be permitted to feel that they are intruders into the domain of younger students. Students in one adult reading improvement class pointed out that they felt somewhat intimidated by the unfamiliar material that remained on the chalkboard from the ninth-grade English classes that used the room during the day. One man who had just received a job promotion commented that his inability to understand ninth-grade English made him feel decidedly pessimistic about improving his reading enough to meet his occupational needs. Another said that when he slid into a desk arranged in an orderly row he felt like he was back in third grade again. Teachers of adult learners must realize that their students don't want to feel they are being given "another chance." Their status is different from younger students, and their classroom setting should acknowledge this.

ESTABLISH EGALITARIAN ADULT-TO-ADULT INTERPERSONAL RELATIONSHIPS

The establishment of satisfying personal relationships is sometimes difficult when large differences in age exist between some of the students and their teacher. Many older adults unconsciously resent being told what to do by someone younger, even in the context of a classroom. The teacher who finds himself teaching students older than he must be especially careful to phrase his instructions and corrections in respectful, non-condescending terms and tones. It is generally good to remain at the Mister and surname level whenever in class. Although younger students may perceive a teacher's use of their first names as a sign of friendliness, many adults will feel uncomfortable about what they consider to be over-familiarity or even disrespect. This situation calls for even greater finesse if the teacher happens to be a young woman. A 45-year-old shop foreman can easily feel both his maturity and his very masculinity threatened when being instructed in reading –in the eyes of many of his peers essentially a child's task–by a cute young thing who in age could be his own daughter.

Many adults have a stereotyped notion of the interpersonal relationships between teachers and pupils. The teacher is expected to call the tunes and the pupil to dance accordingly. Thus, older students are sometimes hesitant about participation in the planning and conduct of their education. They feel it inappropriate to share in decisions about what to read and to discuss frankly the material they have read. Lack of wholehearted participation from the students can force the teacher to resort to an impersonal, mechanical approach to reading improvement that does not draw upon the wealth of experiences and viewpoints that exist in adult classes.

Reading is not an impersonal, mechanical process; and teachers who provide seating arrangements that permit adult conversation and who encourage pupil-to-pupil as well as pupil-to-teacher responses relative to reading selections will capitalize upon the personal resources of adult learners. Teachers should provide plenty of reading material that lends itself to small-group discussion and encourage dialogue by participating in the conversation of the group without evaluating each speaker's contributions. The physical position of the teacher can do much to stimulate or stifle group dialogue. Teachers should sit with the group as equals and avoid positioning themselves at a higher level or as the central focus of the students. Receiving feedback from other students can be as conducive to the development of reading maturity as answering post-reading questions that can be marked correct or incorrect by the teacher.

INVOLVE STUDENTS IN PLANNING THEIR OWN READING IMPROVEMENT PROGRAMS

Adult learners are volunteers who choose to add reading instruction to their other responsibilities. Each student knows how much time he can give to his reading improvement program and must have his program structured in accord with certain limitations. It is not feasible in most cases to make homework assignments on a class basis. A better approach is to confer with students individually regarding the out-of-class practice reading each will do. Conferences may also be used to discover individual interests and needs. Since reading is a process and not a content, students are often able to select from a variety of materials available. Often they can share in the decisions regarding the nature of the instructional approaches to be used. For example, a student may find the need for a particular reading skill particularly pressing because of occupational or family responsibilities. This skill may be given priority over other skills that also need strengthening but are not of such immediate importance to the student. Of course, if the skill needed depends upon one or more skills that also need strengthening, the foundation skills must be given prior attention. This can be explained in a straight-forward manner to the adult learner.

Many adults have some definite ideas about their education and learn better when the instruction they need can be given according to their personal preferences. For example, we have found some adults to be resentful of self-correction materials that were purchased for their use. They wanted a chance for interpersonal communication regarding their answers to the questions asked about the reading material. Reading instruction usually permits choices, and adults should be given the opportunity to share in the making of these choices. Usually a satisfactory balance between what the teacher thinks will be most beneficial and what the students prefer can be achieved by frank discussions of each other's objectives.

ACKNOWLEDGE THE FATIGUE FACTOR IN READING PERFORMANCE

Reading performance is greatly affected by the reader's physical condition. Since many reading improvement programs for adults are given after the students have put in a day's work, their performance in class may not be a good indication of their ability. In addition, an anxiety factor which is in itself fatiguing may be present in the adult reading class. Teachers should make every effort to avoid overtaxing their students either through reading material or reading-related assignments that are too challenging for them in their tired conditions. The surest way to cause an adult student to become a dropout is to convince him that he can't do the work. "I would if I could, but I'm too tired at the end of the day," is all the rationalization some students need to chuck their good intentions to improve their reading.

We have found that some easy "warm-up" exercises at the beginning of each meeting can be invigorating and can also serve to ease students into the more intensive work of the class. These warm-up exercises should be short, non-competitive and fun. We do not advocate speed drills at the beginning of the class because they build too much tension and are, therefore, tiring. Some exercises we have found to be effective for this purpose are using context clues to discover word meanings, selecting titles for paragraphs, arranging sentences in proper sequential order and responding to figurative language. Exercises of this kind are best when they are constructed by the teacher and relevant to specific community or class concerns. However, they can be pulled from workbooks or other reading improvement materials and still be enjoyable.

To further combat deleterious effects of fatigue we recommend a variety of activities during the class including some time for practice reading in high interest materials, periodic refreshment breaks, and small-group discussions of ideas the students have encountered in their reading. We also recommend a minimum of teacher talk to the whole class.

EMPHASIZE INTRINSIC MOTIVATION FOR REWARDS

Adults who voluntarily enroll in a reading improvement course believe that reading will enrich their lives. They know the value of reading for social and professional advancement. They do not as a rule need as many concrete extrinsic rewards as younger students. Their progress in the class is better illustrated to them by repeated examples of their growing ability to use reading in social situations. Whereas younger students may be rewarded by grades and graphic illustrations of progress with developmental reading exercises, the adults for whom we are suggesting the present guidelines are more impressed with their growing ability to use reading for information getting and recreational purposes. Therefore, teachers of adult reading improvement classes of the kind we are discussing should reward their students' growth primarily with satisfying social interactions relative to their reading rather than grades, charts or bulletin board displays that illustrate satisfactory completion of developmental reading exercises. Adults often receive aesthetic satisfaction and a sense of progress from participation in a project that depends upon reading for its successful completion. Examples of projects that adults might be involved in to give them intrinsic rewards are play reading, group discussions, artistic illustrations, expository writing, and construction of a product which requires that written directions or specifications be followed.

Familiarize Adults With the Variety of Reading Material Available to Them

Adults who enroll in reading improvement courses are generally not avid readers. Consequently, they may be unaware of the variety of newspapers, magazines, books, brochures and other reading material available to them from libraries and other agencies. Public health agencies, for example, are excellent sources of reading material for nearly everyone who is concerned about his or his children's health. Because of their relevance to the adult learner, functional and recreational materials can often be used to greater advantage in adult reading improvement courses than material prepared specifically to teach reading skills. "How to do it" material is often more appealing than fiction to adults who are conditioned to recreating themselves with television. Television will nearly always provide entertainment or escape from the real world, but the directions for building a boat, improving a golf game, or remedying a head cold are only available on demand from written sources. A major objective of adult reading programs should be familiarizing students with the wealth of information and pleasure available on demand through print.

The same material that is used to give adults information and pleasure may also be used to improve their reading skills. Teachers can with careful planning incorporate skill development into material that is not expressly written for skill training. Words from a telephone company pamphlet can be analyzed, comprehension questions can be constructed relative to a newspaper article, and magazine articles can be used for rate training. And when functional and recreational material is used for skill building, the problems of transfer and relevance are minimized.

Summary

The adult learners for whom the preceding guidelines were formulated are unique students and need a reading improvement program that is designed differently from the way programs are designed for children, college students, and professional people. Unfortunately, the teachers who are employed to improve their reading often have the same training as the teachers who failed to teach them to read effectively in the elementary and secondary school. When these students volunteer as adults to receive reading instruction, they are in fact giving education another chance. But their experiences, needs ,and perceptions are different from those they had as children. Reading improvement programs prepared for them should reflect an awareness of these differences.

The following six guidelines have been suggested to help reading teachers implement reading programs that are truly adult:

1. Provide a physical setting appropriate for adults.
2. Establish egalitarian adult-to-adult interpersonal relationships.
3. Involve students in planning their own reading improvement programs.
4. Acknowledge the fatigue factor in reading performance.
5. Emphasize intrinsic motivation for rewards.
6. Familiarize adults with the variety of reading materials available to them.

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LEARNING FROM WHAT IS SAID AND WHAT IS READ

In her recent summary article entitled, From Basic Research on Reading to Educational Practice, Williams (1970) sounded a note of concern which I suspect is shared by many involved in reading research. She noted the critical distinction between the processes found in the development of reading skill and those found in proficient reading. "Indeed, the analysis of the differences between the processes found in the development of reading skill and those found in proficient reading is certain to be one of the most challenging research problems [p. 274]." This continuum, from the acquisition of skills to the proficient use of these skills, suggests to me a somewhat parallel relationship which merits as careful an assessment. It is the relationship between processing what is said and what is read.

Most discussions of reading and reading instruction, at least implicitly, have been based on some theory of normal, oral language development. Too often, however, this relation between oral language development and reading either has been unduly obscured or unconvincing. In fact, if we choose to acknowledge the insights and finding of those whom Blumenthal (1970) has dubbed as early contributors to psycholinguistics—men such as Buswell, Huey and Charles T. Gray—we might want to conclude that either we were ahead of the game a half century ago, or concomitantly, we haven't gotten very far since. But, according to Roger Brown, (1970) a good bit of recent reading research no longer is adrift without appropriate anchors of potential for progress. In commenting on relatively earlier reading research, he claims there was concentration

> on just those psycholinguistic processes that are peculiar to reading: the visual identification of graphemes and the translation of graphemes to sound. Because these processes play no part in the perception and comprehension of spoken language, reading seemed a topic sharply distinct from the rest of psycholinguistics. The essays we have reviewed focus on problems that are not specific to reading but are common to the processing of both speech and text. (p. 183)

And he sites some of these basic problems. For example,

> Is language stored as form or meaning? In sentence comprehension, what is the size of the processing unit? By what means is data sampling guided? What are the major surface clues to underlying structure? These are the questions to which psycholinguistics generally is directed and so reading research is no longer an isolated field; indeed its bounds have become a little difficult to define. (p. 183)

The major theme with which I am concerned, however, can be stated much more succinctly. In reviewing several studies related to the research efforts of *Project Literacy,* R. Brown commented: "Much that is asserted in these essays would be as true of speech as of reading [p. 164]." He concluded his review with the comment, "We begin to wonder what causes a researcher to characterize his work as a study of reading rather than as a study of language processing in general [p. 185]." Numerous other examples of an equally explicit nature can be cited, ranging from the writings of Levin and Kaplan: "This model of reading, that is, understanding written material, is in its important aspects applicable also to understanding spoken language [1970, p. 132]," to still another comment by R. Brown on Neisser's 1967 description of the reading process: "This characterization of skilled reading is very like contemporary characterizations of the perception and comprehension of spoken language [p. 184]."

Also stressing this commonality of processing are the remarks of Norman (1969), whose major interests are in the memorial and attentional aspects of human information processing. After briefly referring to some of Kohler's findings, which are reported more fully in another source (Kohler, 1970), Norman has the following to say on decision units in reading and speech recognition:

> The perception of printed words has much in common with the perception of speech . . . We can recognize speech under very poor conditions; the speech waveform may be distorted, mixed with noise, fragmented, and be, in general, a very poor representation of the sounds which actually were spoken by the talker. (p. 42)

At this point, Norman's major referent still is speech recognition, but in view of the increasingly proposed commonality between processing speech and processing print, it would be instructive to listen to a bit more of Norman's comment on what he believes aids in speech recognition while relating his comment to reading.

> First, we use the habits of the speaker to help decode his words. We always do better at understanding speech after we have listened to the speaker for a while. This implies that we change the characteristics of our analyzing mechanisms to match the characteristics of the speaker.
>
> Second, we use the grammar of language to help us. We do better at recognizing material when the number of possible words is limited, but adding grammatical constraints improves our performance even more. Use of these rules lets us reject possibilities which do not fit into the rule. (p. 43)

Norman claims that storage cannot be based on a match of each set of physical symbols against a possible stored representation, if only because the size of the dictionary which must be maintained would be required to increase without limit. He concludes: "There is no grammatical rule which limits the size of sentences. Moreover, almost every sentence we hear, read or speak is novel and differs in some way from all other sentences we have previously encountered (p. 44).

Enough should be suggested by the last citation to warrant an incisive look at the gap between maintaining, on the one hand, that the perception of printed words and speech involve some common processes—in a trivial sense this is obviously so—and, on the other hand, that the underlying processes are in fact almost identical, with some, usually minor, accommodation allowed for the visual aspect of reading. Jones (1968) echoed my concern in her work on perceptual units in language processing. She posed two related questions: What are the units in which auditory language is processed? How may a bridge to the units of visual language best be constructed? She then reviewed several attempts which used a variety of techniques to discover the natural units of language processing. Included in her review were the following factors hypothesized to indicate or produce speech units: intonation contours and/or stress; pauses; separability of parts; frequency of occurrence (redundancy); coding efficiency; ease of learning or retention; and factor analysis.

She concluded that there still was a need for the gap to be bridged between processing auditory and visual units.

Much of the impetus for assessing carefully the relation between the processing of oral language and the processing of written language can be traced to the work of Noam Chomsky and those who have contributed to the development of a transformational-generative theory of language. In particular, Chomsky and Halle's sketch of the oral reading process (1968, pp. 49-50) has attracted considerable attention. In an essay entitled, Reading as a constructive language proc ess, Ryan and Semmel (1969) acknowledged the potential of the Chomsky-Halle model for an insightful view of mature reading, but nonetheless seemed to question its direct or practical relevance for teaching young children how to read. While noting N. Chomsky's earlier speculation that a 6-year-old child's "intuitive organization of the sound system continues to develop and deepen until considerably later [1964, p. 7]," and therefore whose underlying forms quite probably may differ markedly from those of an adult, Ryan and Semmel moved on to review some studies which relate to this phenomenon. Although not overwhelmingly convincing, some of the studies they cite do provide more of a concrete lead than Chomsky himself had provided. Surely, more evidence is needed to buttress N. Chomsky's claim, for example, that "children tend to hear much more phonetically than adults [1964, p. 7]" than merely to assert that this is so. And yet, the assertion had been made. Prior to Ryan and Semmel's discussion, the assertion had been supported by only one general example and one, in his own words, "extreme example," that of his daughter who at the age of 5 "objected to using the same symbol for the two Stops in the word cocoa [N. Chomsky, 1964, p. 7]." One of the studies cited by Ryan and Semmel to substantiate children's sensitivity to superficial features was a study reported by Saltz and Sigel (1967) entitled, Concept overdiscrimination in children. Ryan and Semmel noted that "Saltz and Sigel found that young children were better than adults in noticing differences between very similar stimuli. Their investigations of the overdiscrimination pehnomenon point out that a child, less sensitive to equivalence relations, can find differences before he sees similarities [1969, p. 67]." What Ryan and Semmel did not mention was that those very similar stimuli used by Saltz and Sigel were photographs of children's profiles presented at varied angles. In this case, it would seem as if either a fair degree of extrapolation is expected here or that implicitly we are being asked to assume a fair degree of correspondence in the nature of processing across auditory and visual input modalities.

My skepticism regarding not only the psychological reality, but also the ultimate practical value in terms of reading instruction, of much of what I have encountered on the commonality between processing speech and processing print has diminished somewhat, however, by reading Carol, rather than Noam Chomsky. From the findings of her doctoral dissertation on the acquisition of syntax in children from 5 to 10, she concluded that "Contrary to the commonly held view that a child has mastered the structures of his native language by the time he reaches the age of 6, we find that active syntactic acquisition is taking place up to the age of 9 and perhaps even beyond [1969, p. 121]." In a later article titled, Reading, Writing and Phonology (1970), in which she incorporated her husband's statement of the English phonological system, she proposed some engaging suggestions regarding the teaching of reading, all of which are aimed at facilitating and accelerating the child's internalization of the phonology of his language. In both of her cited works, not only the complexity but the time involved in acquiring a mature command of language as well as literacy emerge as major issues and rightly deserve greater emphasis and further research. In her words, "Literacy acquisition from this point of view may well extend over a much longer period of time than ordinarily assumed, and be closely interrelated with these other aspects of the child's linguistic development [1970, p. 132]." Interestingly, though understandably enough, she has little to say about dialectal differences, a point on which David Reed takes issue. While accepting Chomsky and Halle's statement, Reed believes that in order to provide a more adequate formulation for the purposes of instruction in literacy, descriptions should be made of the phonological systems of six-year-old children from a variety of dialect areas and socio-economic classes (1969). When one is tying a theory of reading so closely to a child's linguistic development—any child's normal linguistic development—perhaps the best resolution we can hope for has been expressed in a similar context by Eric Brown's comment ". . . . we may anticipate a certain confounding of reading and language development problems in the early stages of reading acquisition [1970, p. 70]."

In The Bases of Reading Acquisition, Eric Brown has, I believe, provided us with the best explication of a model of reading based on Chomsky and Halle's outline of the process of reading aloud with, as Brown puts it, "certain analysis-by-synthesis modifications [1970, p. 62]." It is clear that there is a relationship between learning from what is said and learning from what is read. What precisely constitutes the components of either case, to say nothing of the relation between the two, however, still is not clear. But Eric Brown's article strikes me as the most persuasive effort toward bridging the gap in our understanding of processing models for oral language and reading, an effort which hopefully then will aid us in understanding better not only the accomplishments of a skilled reader, but as well, the needs of a nonreader.

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COMPARISON OF WORD RECOGNITION STRATEGIES OF ADULTS AND CHILDREN

Two previous studies provided suggestive data indicating adults can recognize familiar words more rapidly than children (Samuels 1968a, 1968b). The purpose of this study was to provide an answer to the following question: If adults recognize words more rapidly, what differences in recognition strategies give adults this advantage?

The strategies investigated were derived from a model of the word recognition process. Simply stated the model is an information use-hypothesis-test-accept/reject procedure. There are four stages in the model: *Stage 1 (information use).* Information from the reading material already read is utilized. Ex. Father cut the green ________. *Stage 2 (hypothesis making).* Information from the reading material as well as knowledge of the structure of English is used to formulate hypotheses i.e., make predictions, of what the next word will be. Ex. Father cut the green ____________ (next word could be emerald, grass, money, plant, etc.). *Stage 3 (test).* The hypotheses are tested using new information gathered from visually discriminating the next word. Information used to test the hypothesis may be a letter, group of letters, or the whole word. Ex. The reader may see letters "em," which match the word "emerald." *Stage 4 (accept/reject).* If the new information matches one of the predicted words, the hypothesis is accepted and recognition is rapid. If the new information does not match any of the predicted words, the reader must engage in careful time-consuming visual analysis to recognize the word.

If adults are more adept at word recognition, the model suggests several strategies to account for faster recognition: (a) more and faster partial perceptions in absence of total recognition, (b) better ability to utilize clues such as first and last letters and word length, and (c) greater willingness to alter incorrect hypotheses as to the identity of a word.

Method

Subjects

Twenty-five fourth graders and 25 college students were used. Fourth grade *S*s were pretested one week before the experiment was started to ensure they could read the words which were to be flashed. The pretesting included filter words. All *S*s pretested could read all the words used in the experiment. After a screening test to ensure the *S*s could read flashed words, the *S*s within each group were randomly assigned to a row of a 5 x 5 repeated-measures Latin square design and were tested individually.

Materials

T-Scope

A two-channel tachistoscope and the ten word-pairs in the earlier studies (Samuels, 1968a, 1968b) were used to study speed of word recognition. The ten word-pairs were: BLUE-SKY, SALTY-SEA, DARK-NIGHT, LOUD-NOISE, BEAUTIFUL-GIRL, GREEN-GRASS, RED-COLOR, SWEET-CANDY, HEAVY-WEIGHT, COLD-WINTER. The first word of a pair served as a stimulus word and the second word was the target word. Speed of recognition was determined for the target word only.

Word Recognition Strategy Test

Thirty adjective-noun word pairs balanced in association strength for adults and children were used. Every word-pair was typed in upper case 3" x 5" index card. First word of the pair was typed, but the letters of the second word of the pair were typed under three conditions: (a) first letter only, (b) first letter and second letter, (c) first letter and last letter. Every missing letter of the word was indicated by a dash. Examples of the 30 word pairs: HIGH H____, DEEP HO__. SOFT C___N.

Procedure

In the speed of word recognition test, five treatments (facilitation, interference, neutral, control-1, and control-2) were presented in succession, but the order of presentation was randomized between rows and fixed within a row. Following a practice and a familiarization training, the test list was presented. The first word of a pair was shown for one second, the *S* read it aloud, and this was followed immediately by the exposure of the target word. After the target word was flashed, an erasing image was flashed for one second. The target word was shown starting at 10 millisecond (msec.) exposures and increasing by 2.5 msec. each time through the list. The *S* reported whatever he had seen for the target word and was asked to indicate his response certainty in one of three ways: (a) I am very sure, (b) I am not so sure, (c) I am guessing. No feedback was given. The entire list was shown until each target word was recognized twice. The average exposure duration of the first and second correct report of the word was used as S's speed of word recognition.

Following speed of word recognition test, the word recognition strategies test was given. Each card was shown to the *S* for 10 seconds. The *S* was to recognize the second word with some letters missing. Thirty cards were shown in random fixed order. The *S*'s first report of the second word was recorded. No feedback was given.

RESULTS

The same target words were flashed to adults and children in five treatment conditions. Mean recognition speed in milliseconds and standard deviation for adults for the conditions were: Facilitation = 19.35 ($sd = 4.77$), Control-1 = 19.63 (4.68), Interference = 22.70 (5.81), Control-2 = 23.08 (6.12), Neutral = 23.25 (5.53). Mean recognition speed and standard deviations for children were: Facilitation = 21.55 (5.40 , Control-1 = 21.65 (5.86), Control-2 = 26.38 (8.05), Interference = 26.52 (9.68), Neutral = 28.00 (10.30). For each of the five conditions, analysis by t test indicated adults were significantly faster than children in word recognition.

In the absence of a recognition, *S*s were asked if they recognized any part of the word. Adults reported a significantly higher portion of correct partial perceptions than children ($z = 2.00$, $p < .05$) Furthermore, when adults and children were compared in speed of the fastest partial perception, adults reported the partial perceptions at significantly faster speeds ($t = 2.62$, $p < .01$).

When a *S* reported a flashed word, he was asked how sure he was. There was no significant difference between adults and children in the proportion saying, "I am sure," when the response was correct. However, when the response was incorrect, significantly more adults reported they were guessing ($x^2 = 11.32$ $df = 1$, $p < .001$). By being aware they were guessing, adults were more apt to alter an incorrect response for the correct one on the next presentation of the flashed word.

On the word recognition strategy test, the *S* was given word pairs such as DEEP HO_____. Two analyses were done: (a) counting those words which matched the target words, and (b) counting those words which matched the number of letter spaces. Under both criteria adults were significantly better than children.

DISCUSSION

If adults and children are presented words which are common to both, will there be a difference between them in speed of recognition?

Data from this study indicated that in every condition, adults were significantly faster at recognizing the flashed words. The more important questions dealt with what recognition strategies accounted for this superiority.

When a word was flashed at speeds too fast to recognize, adults were able to perceive significantly more of the letters than children. Not only did they see more letters, but they saw them at significantly faster speeds. The partial perceptions are useful in word recognition in two ways. First of all, partial perceptions can be used to test hypotheses. For example, the *S* can test the hypothesis by matching the letters of the partial perception to the letters of the predicted words. Secondly, if none of the letters of the partial perception match the predicted word, by combining prior information from Stage 1 with the new information from the partial perception, new hypotheses can be generated.

On the word recognition strategy test, where word pairs such as DEEP HO___, LONG R__D were given, adults were far superior at using single letter cues, double letter cues, first and last letter cues, and word length to identify a word. Skills such as this are useful in reading. In meaningful reading, we are using prior information to make predictions of the words to follow. As we discriminate the next word, we frequently get only a partial perception of a few letters and some idea of the word length and configuration. If this combination of cues matches our prediction, we accept the hypothesis without having to visually discriminate all the letters. It is this issue of partial cues rather than the detailed analysis of the whole word to which we refer as to "stimulus sampling." Frequently, if we are familiar with the reading passage, in terms of content, syntax, morphemes, etc., stimulus sampling is sufficient and we can read with speed and comprehension.

Finally, the information on how confident the *S* was in his report of the flashed word indicated that adults were significantly more aware than children when their response was incorrect. This ability is important because if the *S* is aware that his response is probably incorrect, he is more apt to reject a false hypothesis. We found *S*s in this study who mis-identified a word, but reported they were confident that they were correct. Several of the *S*s kept reporting the wrong word each time it was flashed, until the speed got so slow that they were able to correct their mistake.

SUMMARY

The four stages of processes in the word recognition model are: Using information contained in a reading passage, generating hypothses of what the next word might be, testing these hypotheses using cues such as partial perceptions of letters, word length, etc., and accepting or rejecting the hypotheses. Any strategy which facilitates a process should facilitate recognition. In this study, with every strategy test used, adults were superior to children and the superior strategies should account for their faster speed of recognizing words.

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SOME EXPERIMENTS ON VISUAL AND AURAL WORD RECOGNITION

How is a word recognized? This question has probably been asked ever since people began to worry about reading instruction. Some of the most famous early experiments on reading were concerned with processes of word recognition; Cattell's studies, and those of Erdmann and Dodge, for example, were done before 1900. With all the interest and research on the topic, however, we still cannot delineate the strategies a reader actually uses when he identifies a word. Does he respond to the overall configuration of the word? Or does he notice individual letters? Do correspondences between spelling patterns and phonemes, once they have been learned, provide the primary cues? We are not sure.

Most of the work to date—including my own—has focussed on the recognition of words when they are presented visually. I should like to describe a couple of studies of this sort. Recently, my students and I have become interested in the aural mode, and I'd like also to tell you about some data on aural word recognition.

The studies that I shall describe are, in effect, laboratory studies, and they must be evaluated as such. People have often been too quick to over-generalize about data collected under carefully specified, artificial and arbitrary laboratory conditions. It is important to keep in mind the dangers of doing this, although naturally the temptations are great for the experimenter. I believe that one excellent way to develop hypotheses about the nature and sequencing of instructional materials is to make comparisons in the laboratory, where crucial variables can be isolated and manipulated. But this type of work, of course, is only an initial stage in the development of materials and techniques to be used in the classroom.

Before a child can recognize a word, he must have learned to some degree how to differentiate the written symbols that he finds on the printed page. Gibson et al. (1962) has suggested that improvement of visual discrimination depends on learning the distinctive features of the forms to be discrimintaed, i.e., those dimensions of difference that distinguish the stimuli. Presumably, these distinctive features include such things as size, orientation, and symmetry. Some progress toward precise specification of the critical features of the letters of the alphabet has been made, but it is a most difficult task.

It is obvious in any case that the graphemic characteristics of the word provide an important category of cues in visual word recognition. One of my students, Margaret Ackerman, and I did an experiment concerned not with the nature of the critical features themselves, but rather with the effectiveness of different training methods in ensuring that attention is focussed on the features, whatever they may be.

In this experiment (in press) we compared simultaneous and successive discrimination tasks involving highly similar letters (*b* and *d*) and dissimilar letters (*s* and *b*). Forty first-grade urban children were used as subjects. In simultaneous training, the two letters were presented at the same time, and on every trial, the subject was reinforced for responding to the same one of these stimuli, regardless of its spatial position. In the successive discrimination problem, only one letter was presented on each trial. The subject learned to press the left of two response buttons when *b* was presented, and the right button when *s* was presented. Theoretically, successive discrimination should have been more difficult. However, we found that with highly similar stimuli (*b* and *d*), the successive problem was less difficult than the simultaneous problem; while with dissimilar stimuli (*s* and *b*) the successive problem was more difficult. Analysis of variance on the mean number of correct responses during training showed that while neither main effect was significant, the interaction was. These findings were unexpected, so we replicated the study—and got the same results. Our notion is that for the *s-b* comparison, distinctive cues (such as size) are easily identified, and so, in simultaneous training, the subject has from the start some basis for comparison and differentiation. However, *b* and *d* are notoriously confusing to a first-grader, and the cues that are to be used in the solution of this discrimination problem must be developed during the training. It is possible that simultaneous training in this case presents the subject with so much information at one time that the identification of some critical feature which can be used in comparison will be hindered.

Because the results of this experiment were so different from what was expected, we decided to see if the same result would occur in a more complex task. In a second experiment, highly similar letters (*b* and *d*) were combined into trigrams which were presented in a paired-associates paradigm. This task was chosen because it simulated the early reading task, in which the child must learn to associate phonemes with their graphic values.

Two combinations were possible. First the stimuli could be presented simultaneously in a single trigram–*bad* (or *dab*). This approximates the simultaneous training studied in the first experiment, in which both *b* and *d* appeared on every trial. On the other hand, the stimuli could be presented successively, that is, with only one of the two letters appearing in a given trigram–*bab* or *dad*. This approximates the successive training of Experiment 1. In light of the results of Experiment 1, we predicted that performance would be superior when the highly similar stimuli were presented successively, that is, when the trigrams were *bab* or *dad*.

Forty-eight first-grade children served as subjects. There were four trigrams in the list *bad* and *dab* (or *dad* and *bab*) were the critical trigrams. Two additional trigrams were added as "non-criticals" to fill out the list. These–for example, *ban* and *sab*–where chosen so that the subject could not differentiate on the basis of either initial or final letter. A paired-associates paradigm (anticipation method) was used, in which the trigrams were stimuli and color words were responses. Subjects were run until they had performed correctly on two trials.

The most important comparison was of the critical trigrams–whether or not they were learned more easily in successive training, as we had predicted. They were. There were no such differnces for the non critical trigrams. (Parenthetically, we noted that the critical trigrams that started with *d* were harder than ititial *b* trigrams. It may be that children develop effective discrimination of the letter *b* earlier than they do for *d*.)

An analysis of errors, which I shall not report now, confirmed our findings. The results of this second experiment led us to the same conclusion; that is, in successive training, the child has a chance to identify a distinctive feature and learn the discrimination on the basis of that feature. These results suggest to us that readiness programs that include letter-discrimination and letter-naming training can be most effective if different methods are utilized for different letters. Letters which are distinctive can be introduced simultaneously, and they will probably require less training than will letters that are highly similar; these should be introduced successively.

Visual and Aural Word Recognition

Now let us turn from comparisons of training methods to more descriptive data. In 1965, Marchbanks and Levin did a study that assessed the relative importance of several graphemic cues in children's matching responses. They asked middle-class children in kindergarten and first grade to compare the similarity of three-letter and five-letter pseudowords. They found that the specific letters are much more important in determining recognition than is the overall shape of the word. I shall describe the task, because I want to report some data that we have collected using this method.

The task consisted of a delayed matching-to-sample procedure. The stimuli were three-letter and five nonsense words (trigrams and quingrams). A slide containing a single pseudoword was projected for three seconds. Then this word was removed from sight and an array of several randomly arranged words appeared, from which the subject was to choose one that most resembled the stimulus word. The words on the response slide were so structured that each choice represented one of a systematic series of errors that might be made. For example, it was possible to match the stimulus *cug* on the basis of the first letter (*che*), the second (*tuk*), the third letter (*ilg*), or on the basis of overall shape (*arp*). For the quingrams, it was possible to evaluate six cues—each letter plus overall shape. Shape was defined by whether the letters were above, below or on the line. On some trials, in order to find out what happens when the subject does not have the choice of recalling all of the cues but only some of them, certain cues were held constant in the response items. The subject had an equal opportunity to respond on the basis of any one of the individual letter cues.

Ellen Blumberg, David Williams, and I did a study (1970) with disadvantaged urban children, to see what true non-readers would do. Our kindergarten sample had had no formal reading training and had little or no knowledge of the alphabet. We found that these children showed no preference for any of the cues; they matched on a random basis. Our first grade sample had had some reading training. They behaved exactly as did Marchbanks and Levin's middle-class children. That is, individual letters, especially the initial letter and then the last letter, provided the important cues.

What implications are there here for instruction? In view of these and other findings, there really seems to be no justification for developing instructional methods or primer materials based on the use of overall shape as the primary cue. Shape seems a poor choice after reading training is begun, for when children know the alphabet, individual letters become quite salient. Morever, if one's instructional strategy were to attempt to capitalize on tendencies seen before any instruction is given, shape would be poor choice, for there was no tendency at all on the part of our non-readers to utilize this cue.

We also tested some adults on this task. The data were quite different from those of the children; the adults' choices were much more complex. Surprisingly, although the task as presented seemed wholly visual, half of the subjects reported some use of an "aural" strategy–rhyme, for the most part. The other half reported that they used a purely visual strategy, and again surprisingly, half of these described their strategy as one in which they tried to match on the basis of overall shape. This had been the least salient cue for the children.

These results remind us once more that it should not be assumed that adults and children behave in the same manner on this type of visual matching task. Indeed, it is interesting to note the fact that while many widely-used reading methods over the past thirty years have stressed identification of words on the basis of overall shape and configuration, it is adults and not children who sometimes show this strategy in word recognition.

After having completed this experiment, I feel that this experimental technique is a promising one for studying word recognition. In fact, one of my graduate students, Janet Kuenne, has used it quite successfully in her doctoral dissertation. Kuenne (1970) was interested in what cues might be used in identifying a word aurally. She argued that any successful instructional program for beginning reading must stress the establishment of associations between elements of the spoken language and elements of the written code. Such methods, of course, depend on, first, the child's ability to discriminate, both aurally and visually; and secondly, on the ability to integrate these two sensory modes. We have very little evidence concerning how young children make discriminations in the aural mode; we do know, from the work of Liberman and others, that there are fundamental differences between aural processing and visual processing. In her experiment, Kuenne asked children in kindergarten, first grade and second grade to match tape-recorded nonsense syllables. Let me give you an example of her materials and her procedure. Suppose that kəg were the word used as a standard. The child would hear this word, and then would hear three variations–for example, kəz, gək, and kɪf. He would then choose one of the three as the best match for the standard. As in our earlier work, the task was structured so that each choice represented one of a systematic series of errors that might be made. In all, Kuenne evaluated five cues: the initial consonant phoneme, the initial consonant syllable, the final consonant phoneme, the final consonant syllable, and a complete reversal of the stimulus standard. For example, take the standard kəg: if kɪf were chosen as a match, the child would be matching on the basis of initial consonant phoneme; kəz would represent a match on the basis of initial consonant syllable. Similarly, dæg would be a match on the final consonant phoneme, and sɔg on the final consonant syllable. gɔk is the reversal of kɔg. Clearly, a young child could never store and evaluate five stimuli as possible matches for a standard. That is why each item was designed so that only three comparison words appeared; of course, over all items and over all subjects, there was an equal number of opportunities to respond to each cue.

Kuenne found that two of the five cues were chosen significantly more frequently than any of the others. These two cues the final consonant syllable and the initial consonant syllable. There was no significant difference between these two, although there did seem to be a tendency for the final consonant syllable to be more frequently chosen. The other three cues were chosen equally often. There were interesting developmental differences. As in the earlier visual study, it was the older children—the second-graders—who showed the effect most clearly. The same trends were evident in the data from the kindergarten children, but there were no significant differences. In addition, the girls in the first grade were more similar to the second grade subjects, while the boys in the first grade looked like the kindergarten sample. This, of course, reflects the typical finding that girls are more advanced in verbal tasks and show more differentiated behaviors at an earlier age.

Kuenne's study is useful in that it demonstrates that the experimental technique used in studies of visual word recognition are also feasible in studying the aural modality. Moreover, the superiority of the syllable over the single phoneme cue focusses on the general question of the nature of perceptual unit. What is the relevant unit to consider when evaluating cues in aural word identification? How does it relate to the unit in visual word recognition?

In addition, another question arises. The superiority of the initial letter in visual word recognition is well established. Is position a relevant cue in aural recognition? Kuenne's data suggest that if it is, the final position may well be most salient. The implications of this sort of difference between the two modalities might lead to a better understanding of some of the beginning reader's difficulties.

In this paper I have been considering intra-word cues only. Clearly, the context in which the word appears is at least as important. That is, a reader makes use of the information contained in the rest of the sentence in his efforts to recognize a word. More research emphasis is being placed on context, or, to state it another way, the search for cues when units larger than a single word are considered. Some comparisons between the two modalities, aural and visual, have been made (see Hubbard-Jones, 1968, for example).

In summary, I have described several studies on visual and aural word recognition. I have discussed them in terms of how they may contribute to the understanding of the nature of visual and aural processing. I have also attempted to outline certain implications of these findings that might suggest some feasible hypotheses for various aspects of instruction.

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DEVELOPING A DATA BASE FOR MODEL BUILDING IN READING

This paper is an overview and progress report of the Targeted Research and Development Program in Reading (TRDPR), Project No. 2: Literature Search, proposed by Kling, Geyer and Davis (1970) and funded by the U.S. Office of Education through authorization of the National Center for Educational Research and Development for the period June 30, 1970-Dec. 31, 1970.

Other reports pertaining to sections of the Literature Search will be presented at this Symposium by Singer on learning to read, Geyer on modeling the reading process, and Athey on language development. [They are the following papers in this yearbook.]

OBJECTIVES OF LITERATURE SEARCH

The primary objectives of the Literature Search outlined by Kling, Geyer and Davis (1970) are:

1. identify and evaluate all significant contributions to the literature in:
    a. language development related to reading;
    b. the reading process;
    c. the development and refinement of skills involved in reading;
2. identify in the literature explanations of how these processes operate and how the behavioral events or operations within them interact with one another (in short, to identify or build models or partial models of these processes);
3. to describe and synthesize models and partial models so as to present as many different logically coherent models in each of these areas (or in any combination of the three) as seem necessary to exhaust the insights and evidence available.
4. describe the hypotheses and associated tests central to developing new research studies needed to refine and extend the models presented, to test the assumptions upon which they are based, and to synthesize with them the unincorporated facts and insights of the fields studied.

Prerequisites for Developing a Data Base

It appeared that in order to carry out the objectives of the Literature Search several prerequisites seemed necessary to mount such a program:[1]

- 1.0 that a team of Reviewer Evaluators who were scholars needed to be forged.
  - 1.1 that this team should come from a variety of disciplines.
  - 1.2 that this team represent various theoretical and research points of view.
  - 1.3 that the members of the team be active researchers in their given disciplines working to bridge the respective discipline with reading.
  - 1.4 that the members of the team demonstrate interest and creative effort in model building.
  - 1.5 that these scholars be involved in on-going graduate and training programs.
- 2.0 that an Advisory Panel be part of the TRDPR group and also have compatible characteristics with the Reviewer Evaluators as to 1.1, 1.2, 1.3, 1.4, and 1.5.
- 3.0 that a Central Processing Group (CPG) be established to coordinate and facilitate the activities of this consortium of scholars. Characteristics of the CPG should reflect some of the following:
  - 3.1 compatibility with the prerequisites in 1.1, 1.2, 1.3, 1.4 and 1.5.
  - 3.2 have available computer capabilities as to programs, programming and hardware.
  - 3.3 that internally, a series of activities be developed to insure interface between Reviewer Evaluators, Advisory Panel members Central Processing Group. Some of these activities include conferences and feedback operations.
- 4.0 that externally, meaningful reporting to various professional groups be part of the schedule of the contract. (Three conferences have already been scheduled. They are the National Reading Conference at St. Petersburg between December 3-5, 1970, the American Educational Research Association meeting in New York between February 4-7, 1971, and the International Reading Association meeting in Atlantic City between April 19-20, 1971, where a two day presession will present the findings of the TRDPR team and the other two projects.)

Selection of Reviewer Evaluators

Table 1 presents the areas, domains, names and university affiliations, and academic specializations of the Reviewer Evaluators. Inspections of Table 1 reveals a total of 12 domains in three areas, Language Development, Learning to Read and the Reading Process.

In the Language Development Area, three domains, language from an applied linguistics point of view, theories of language development and developmental sociolinguistics are covered.

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[1] During the weekend of April 10, 1970, Athey, Geyer, Kling and Singer met at Rutgers to examine the prerequisites and nature of a Literature Search. The heart of the proposal subsequently submitted was based on the seminal thinking of that meeting. A few weeks later Davis joined the TRDPR proposal writing team of Geyer and Kling. The writer acknowledges with gratitude the support of Dean Milton Schwebel, Graduate School of Education, Rutgers University, for providing seed money for the planning sessions and the implementation of the proposal which was submitted to the U.S. Office of Education and subsequently was the basis for the contract for the Literature Search.

Table 1

Review-Evaluators for Literature Search in Targeted Research and Development Program in Reading

Area	Domain	Name and University	Academic Specialization
Language Development	Theory of Language Development	Irene Athey University of Rochester	Early Childhood, Reading
	Language Behavior	Ronald Wardhaugh University of Michigan	Applied Linguistics, Reading
	Developmental Sociolinguistics	Doris Entwisle Johns Hopkins University	Sociology
Learning to Read	Writing Systems	William Gillooly Rutgers University	Verbal Learning
	Cognitive, Affective	Joanna Williams University of Pennsylvania	Learning, Psychological Bases of Reading
	Operant Models	Richard Bloom State University of New York, Stony Brook	Operant Learning, Mathemagenic Aspects of Learning
	Computer Simulation Models	Duncan Hansen Florida State University	Programmed Learning
Reading Process	Psycholinguistics, Information Processing	Wendell Weaver University of Georgia	Psychology of Reading
	Sensory Processing	H. Richard Schiffman Rutgers University	Psychology of Perception
	Psychometric Models	Frederick Davis University of Pennsylvania	Psychology of Reading, Psychometrics
	Eye Movements, Neuropsychology	Norman and Jane Mackworth Stanford University	Psychology of Perception
	Experimental Linguistics	Stanley Wanat Cornell University	Linguistics

In the Learning to Read Area four domains include orthography, computer simulation models, operant conditioning, and intellectual and non-intellectual factors affecting the learner.

In the Reading Process Area, five domains are considered ranging from sensory processing models, eye-movements and neuropsychological factors, information processing, experimental linguistics and psychometric models.

Thus it can be seen that the prerequisites under 1.0 are met.

Selection of Advisory Panel

Table 2 lists the Advisory Panel for the Literature Search by the same three areas as Reviewer Evaluators.

Table 2

Advisors for Literature Search in Targeted Research and Development Program in Reading

Area	Domain	Name and University	Academic Specialization
Language Development	Linguistics	Richard Hodges University of Chicago	Applied Linguistics
	Psycholinguistics	Robert Ruddell University of California, Berkeley	Language Arts
	Cognitive Development	David Elkind University of Rochester	Developmental Psychology
Learning to Read	Verbal Learning	James Deese Johns Hopkins University	Learning, Psycholinguistics
	School Learning	Harry Singer University of California, Riverside	Psychology of Reading
Reading Process	Neurophysiology-Biophysics	Robert Efron V.A. Hospital, Martinez, California	Neurology
	Information Processing	Paul Kolers University of Toronto	Human Factors
	Psychology of Reading	Albert Kingston University of Georgia	Educational Psychology
	Brain Mechanisms	Karl Pribram Stanford University	Neuropsychology, Neurophysiology

Inspection of Table 2 indicates that the Advisory Panel clearly interfaces with the domains covered by the Reviewer Evaluators. The nine Advisory Panel members are drawn from an additional four universities and one neurological research laboratory.

Selection of Central Processing Group

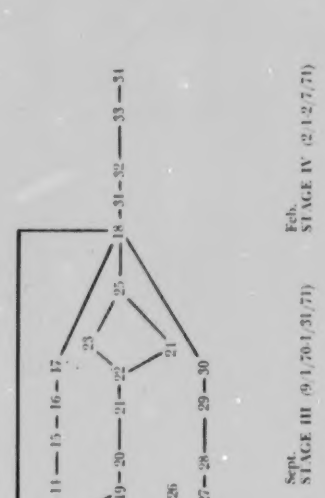
Table 3 shows the make-up of the Central Processing Group necessary to facilitate the detailed planning of conferences, training procedures, data processing, retrieval functions, and organization necessary to enhance the creative efforts of the Reviewer Evaluators. In addition to feedback within the TRDPR team, provision is also made for liaison between the other two projects of the overall Targeted Research in Reading of the Right to Read Effort. The Convergence Technique is further described by Carrese and Baker (1967), Gephart (1970a, 1970b), Kling (1971) and Penney, Hjelm and Gephart (1970).

Table 3

Central Processing Group for Literature Search in Targeted Research and Development Program in Reading

Project Responsibility	Name	Academic Specialization
Principal Investigator	Martin Kling	Reading Theory, Psychology of School Subjects
Director	Frederick Davis	Psychology of Reading, Psychometrics
Associate Director	John Geyer	Reading Models, Sensory Processing
Project 1 Liaison Development of Specifications for Criteria of Measurement of Adult Functional Reading	Frederick Davis	Psychology of Reading, Psychometrics
Project 3 Liaison Literature Search for Instructional Practices and Outcomes	James Kimple	Educational Administration Superintendent of Schools South Brunswick Township
Reading Processes: Area Coordinator	John Geyer	Reading Models, Sensory Processing
Learning to Read: Area Coordinator	Joanna Williams	Learning, Child Development, Reading
Language Development: Area Coordinator	Irene Athey	Early Childhood, Reading

Figure 1



STAGE I: Preliminaries (June 30-Aug. 27)
1. Start
2. Select Reviewer Evaluators
3. Select Advisory Panel
4. Working bibliographies submitted by each R.E. & A.P. for his area and domain
5. Synthesis and distribution of bibliographies
6. Organization and training of CPG
7. Conference preparation
8. Develop coding and operational procedures

STAGE II: Conference of TRDPR Team (Aug. 28-30)
9. Conference at Rutgers

STAGE III: Analysis of the Literature (Sept. 1-Jan. 31)
10. Items in listed sources selected on priority basis
11. Articles presenting research models
12. Articles presenting non-research models
13. Review of cataloged models
14. Description of the model (abstract of article)
15. List critical assumptions
16. Categorize model
17. List constituent elements
18. Submit to CPG all data cataloged (coded, stored in master bibli.)
19. Research studies pertaining to models
20. Abstract studies
21. List assumptions
22. Profile (review methodology)
23. List author's weak conclusions
24. List author's strong conclusions
25. List R.E.'s conclusions
26. Non-model research articles
27. Non-model, non-research articles
28. Abstract studies
29. List assumptions
30. List untested hypothesis
31. Compiled, coded, print-out of submitted articles returned to R.E.'s
32. R.E.'s submit critical review of models in their areas and domains

STAGE IV: Presentation of Reviews of Literature (Feb. 1-7)
33. Semi-annual progress report and conference (Feb. 1-3)
34. AERA Conference (Feb. 4-7), NYC
35. CPG eliminates redundancy and errors in master bibliography
36. CPG performs detail planning of synthesis phase
37. CPG submits list of overlaps to R.E.'s in area and domain
38. CPG submits general index to R.E.'s in each of three areas
39. CPG submits author index to R.E.'s in each of three areas
40. CPG submits periodic dissemination of coded sound conclusions to all R.E.'s
41. CPG processes R.E. queries

STAGE V: Synthesis of Literature (Feb. 7-May 15, 1971)

PRE SESSION: International Reading Association (April 19-20, 1791) Atlantic City, N.J.

STAGE VI: Synthesis and Final Report (May 15, 1971-June 30, 1971)

Fig. 1 Literature Search PERT Schematic.

SIX STAGES AND ACTIVITIES IN LITERATURE SEARCH

Stages I-VI are presented in Figure 1 together with the 41 items items necessary to implement the Literature Search.[2]

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[2] The writer gratefully acknowledges the efforts of Dr. John Geyer and Mr. John Nealon, Management Consultant, in developing the PERT logic connected with Figure 1.

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Stage I: Preliminaries

Items 1, 2, and 3 have been summarized in Tables 1 and 2, dealing with the Reviewer Evaluators and Advisory Panel members.

Item 4, representing working bibliographies, is a continuous process beginning with the initial stages of the project and continuing unitl the end of the fiscal year, June 30, 1971. As of November 25, 1970 the Reviewer Evaluators, Advisory Panel and Central Processing Group submitted 8,102 references with the following breakdown:

Learning to Read references	2,145
Reading Process references	4,353
Language Development references	1,604
Total	8,102

Stage II: Conference of TRDPR Team

Item 9 represents an intensive three-day conference with 90% of the TRDPR team attending, which determined procedures and criteria for inclusion of references. From the TRDPR team discussions a Reference Evaluation Form (REF) was developed under the leadership of Dr. Jason Millman, Professor of Educational Research Methodology, Cornell University. Three reference categories were determined to be part of Item 10:

1) Model—formulates systematic explanation of phenomena that allows prediction
2) Research—tests hypotheses empirically or logically
3) Non-research—no attempt to test hypotheses empirically or logically

The main purpose of the REF was to assess those references in the working bibliography which warranted further critical review.

Stage III: Analysis of the Literature

In this stage five main tracks flow from the type of reference categorized. One track, research models, is indicated by Item 11 which proceeds to be analyzed in terms of 13, 14, 15, 16, 17, 18, 31, 32, 33 and 34.

The second track, non-research models, begins with Item 12, and proceeds through 13, 14, 15, 16, 17, 18, 31, 32, 33 and 34.

The third track, research studies pertaining to models, begins with 19 and proceeds through 20, 21, 22, and either 23 or 24, and then on to 25, 18, 32, 33 and 34.

The fourth track, non-model research articles, is 26 which proceeds to 20, 21, 22, and either 23 or 24, and then to 25, 18, 31, 32, 33 and 34.

A fifth track, non-model and non-research, begins with 27 and proceeds through 28, 29, 30, 18, 31, 32, 33 and 34.

The heart of these five tracks is developed in the REF which is an eight-page form that covers Items 11 through 30. To date, 215 REF's have been received. The assessment of the literature through the use of the REF's is an on-going process and will continue through the end of the project.

Stage IV: Presentation of Review of the Literature

This stage of development will consist of a conference among TRDPR members for three days in which critical reviews will be presented as working papers in the form of *Psychological Bulletin*-type reviews. Immediately following the internal conference, shorter, more formal presentations will be made externally at the 1971 AERA meetings.

In addition to the internal and external conferences, CPG has computerized Items 35, 37, 38, and 39 with the aid of a retrieval program called TEXT-PAK[3] initially developed by IBM which was modified for use with the IBM 360/67. CPG is also doing a feasibility study to assess the extent to which Items 11-31 can be computerized.

QUEST FOR SYNTHESIS: STAGES V AND VI

To date, no single individual or group has had as its main thrust the explicit purpose of synthesizing the field of reading in the manner outlined in this paper. The nature of this synthesis is a creative task calling for the the detailed planning and utilization of the talent and resources of the individuals and institutions from which this team is drawn. How successful this team will be in carrying out its charge of coming up with a minimum number of models to account for a maximum amount of reading behavior remains to be seen. No claim is made for the finality of the Literature Search reports. The very nature of the scientific endeavor is tentative and open to the continuous scrutiny of the scientific and professional communities.

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[3] The writer appreciates the efforts of Mrs. Leny Struminger, Programming Analyst, Graduate School of Library Service, Rutgers University, for implementing the TEXT-PAK system for use in this project.

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THEORIES, MODELS, AND STRATEGIES FOR LEARNING TO READ[1]

Although evidence has been accumulating for some time on the effect of various methods and strategies for teaching reading, only recently have models been constructed to represent the variables involved in reading and theories been formulated to explain the processes of decoding, comprehending, and encoding of printed messages (Holmes & Singer, 1964; Singer & Ruddell, 1970).

These models, as well as theories and research on cognitive, linguistic, and emotional-social development indicate that qualitative and quantitative changes in theoretical formulations and models of reading behavior are necessary for each stage of development (Singer 1965a, 1969; Athey, 1970). Consequently only those theories, models, and strategies that focus on the initial stages of acquisition of reading development are included in this review. First, we shall summarize methods of teaching reading, and then, in order, learning theories and strategies, linguistic theories, and finally, reading theories and models for learning to read.

METHODS OF TEACHING READING

In the history of American reading instruction (Smith, 1965), the unit of initial instructional emphasis has varied in a surprisingly systematic way from the smallest to the largest stimulus. At first, the unit of emphasis was the letter or alphabet method with its emphasis upon spelling procedures and its premium upon memorization processes for learning to read. Next on the continuum was phonics with its emphasis on letters or word parts (digraphs, blends, syllables, affixes), association of sounds with their printed counterparts, and premium upon auditory discrimination and pronunciation. Further on the continuum was the whole word as the stimulus unit, association between printed word and picture, and visualization as the primary mode of learning. Finally, and more recently, the other extreme of the continuum has been the sentence and paragraph or experience chart method as the initial stimulus unit with its stress upon meaningful context or experience of children, and the cumulations of expectancies and linguistic redundancies for providing for adequate stimulus input, clarifying meanings, and confirming word recognition predictions (Singer, 1966, 1968).

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[1] This paper was prepared as part of the U.S.O.E. Targeted Research and Development Program in Reading, Project Two: Literature Search, Martin Kling, Rutgers University, Principal Investigator. The author is a Panel Evaluator for the reading acquisition component of the literature search. Parts of this paper have been reported elsewhere (Singer 1965a, 1965b, 1966, 1968, 1969, 1970a, 1970b).

For some time the basal reading method dominated the American scene of reading instruction (Austin & Morrison 1963). But, as a result of considerable experimentation in methods and media for reading development over the past ten years, the stimulus or input instructional unit now emphasized in American classrooms covers the entire continuum from the letter unit to the paragraph or whole story method.

This methodological continuum has been defined by Chall (1967, pp. 102-103) as varying along a dimension of emphasis with "coding" or stress upon word recognition at one extreme and "meaning" at the other. Programs which tend to start with synthetic phonics separately from connected reading define one extreme of the continuum. Next on the continuum are linguistic and modified alphabet approaches. Towards the meaning end of the continuum are intrinsic phonics programs which stress sight words and meaning. Closest to the meaning end of the continuum are programs which stress the "look-say" approach and emphasize "thought" or meaning, but tend to teach no phonics, at least in the initial stages of reading instruction. Chall concludes that more emphasis in beginning instruction is needed towards the decoding end of the continuum.

However, regardless of the instructional method employed, the age-equivalent range of achievement in a representative heterogeneous classroom will still approximate two-thirds of the chronological age of the group, if all the children in the class are, in fact, reading at a level equal to their mental age expectancies (Bond & Tinker, 1967). Consequently the often asked question of whether one method is better than another is meaningless. Instead, the questions we might ask, are how do invidiuals learn to decode print to speech?What is the extent to which variations in method or initial units and sequences of instruction have to be adapted to individual differences in learners? What are the short and long range effects of differing input strategies upon the reading progress of various groups of children? The answers to these and other meaningful questions might enable us to increase the percentage of children who do attain expected progress in reading acquisition.

Although a multitude of questions on acquisition of reading ability still need to be answered (Gibson, 1970), there are only two major classes of learning theories, stimulus-response and cognitive or field theories of learning, to draw upon in designing models for teaching reading.

LEARNING THEORY FOR TEACHING READING

Stimulus-Response Models

Thorndike's model for reading instruction is based upon his stimulus-response theory of learning. Assuming that the unit of perception in learning to read is the whole word, Thorndike argued that learning to read depends upon acquisition of correct oral responses to printed words. All the teacher has to do then in teaching children to read is to expose each stimulus word to the pupil, identify its correct oral response, and upon subsequent trials or exposures of the printed word, provide for satisfying consequences for correct responses from the pupil.

For increasing the probability of obtaining satisfying consequences and also for utilitarian purposes, Thorndike reasoned that the most frequently occurring words should be taught first. This reasoning led Thorndike to construct his *Teachers Word Book* (Thorndike 1921, 1931; Thorndike & Lorge, 1944), which became the vocabulary source for almost all present day basal readers. Thorndike's theory of learning applied to reading instruction was also adopted as the basal readers' instructional rationale. Even the round-robin or reading-in-a circle procedure widely used today in most first grade classrooms is based on the Thorndikian model for teaching reading (Singer, 1970a). Furthermore, his model is also used for teaching correct responses to constituent parts of words, such as occur in phonics and structural analysis skills in basal readers (Singer, 1971). Because the words used and ideas represented in basal readers are usually within the average first grader's vocabulary and experiential repertoire, oral responses or reconstruction of printed words is supposed to then lead to association of meaning (Carroll, 1964). It can of course simply result in the recoding of the printed message into an oral rendering.

Another S-R theory, Skinner's reinforcement of emitted responses theory of learning with its concept of shaping of behavior and its use of reinforcement schedules, has been employed by Staats (1965) to teach and to explain the acquisition of accurate responses to printed stimuli. Using an instructional apparatus based upon Skinnerian theory, Staats has demonstrated through careful control of frequency of input stimuli, extrinsic reinforcement of correct verbal responses by means of tokens for purchasing food or toys, and attention through reinforcement techniques to relevant stimuli in the learning situation, that children, even preschoolers, remedial readers, and delinquents, can be trained to respond accurately to printed words, at least in the initial stages of learning to read. Others, such as Ellson, et al. (1965) have conducted similar demonstrations with programmed instructional material and Moore (1961) has successfully adapted Skinnerian theory to a "talking typewriter," later called an autolelic or responsive learning environment, and has taught three-year olds to decode printed words.

Although Thorndikian and Skinnerian teaching models on a pragmatic level appear to be successful in the initial stages of reading, the assumption upon which they are based seems to be false. Children apparently do not perceive whole words at a glance in the initial stages of learning to recognize printed words. In fact, they tend to take on the average at least two fixations per words (Buswell, 1922).

Furthermore, Thorndikian and Skinnerian theories are quite limited in explaining and formulating research to discover new phenomena in reading. Implicit in both of these models is the narrow definition of reading that correct oral responses alone to printed words is reading. Even if these models were used to teach children according to the broadest definition of reading, they would still be inadequate for *explaining* the acquisition of reading behavior because no attempt has been made in either S-R or Skinnerian theory to explain how and why the learner can acquire, organize, store, reorganize, formulate his own purposes, and mobilize appropriate subsystems for responding to the printed page (Singer, 1962, 1966). Of course, S-R theory can explain how individuals can learn to discriminate, abstract, and generalize, but S-R theory does not attempt to explain or predict the formation of conceptual systems. Essentially, then, the Thorndikian and Skinnerian models do not take into consideration the cognitive capabilities of the learner for acquiring, selecting, processing, organizing, and utilizing a repertoire of conceptual systems for actively responding to the printed page (Singer, 1966).

However, if the cognitive and affective capabilities of the human learner were added so that S-R theory became an explicity formulated stimulus-organism-response or S-O-R model, perhaps using a mediational response concept (Woodworth, 1929; Osgood, 1953), hypotheses could be derived and tested to determine the conditions for developing the cognitive capacities of learners into an adequate conceptual system for reducing and processing the mass of detailed information necessary for responding accurately and meaningfully to printed words. Also, instructional conditions for developing and integrating the affective, conative, and cognitive systems of the individual might also be discovered and incorporated into S-O-R theory. Some research along these lines has already been conducted (Athey, 1965; Athey & Holmes, 1969; Davis, 1964).

For theoretical and educational purposes, merely developing accurate responses to printed words is not enough; theory and instruction must take the individual from correct responses to printed stimuli under extrinsic motivation to critical and creative reading performance under intrinsic or curiosity-aroused motivation. This developmental transition from a conditioning or stimulus response mode to a cognitive mode of learning has been attributed by Holmes (1965) to the formation of "mobilizers," psychocatalytic mechanisms derived from the establishment of value systems and attitudes conducive to the realization of self-actualized goals and purposes in reading. These value systems are more likely to arise when individuals have been reared under conditions which have taught them to resolve their developmental, emotional conflicts in a positive direction of trust, autonomy, initiative, industry, and love (Athey, 1970).

Field or Cognitive Learning Theory Models

An active, purposeful and flexible mode of response to printed words can be developed from the beginning of formal reading instruction through field theories of learning which stress such concepts as purposeful behavior, knowledge of means-ends relationships, and various routes to goal achievement. Although not as systematically employed in instruction as S-R theories, field or cognitive learning theory models can be recognized in such approaches to teaching reading as the language arts and individualized reading methods.

Emphasis in the language experience method is on starting the learner with a meaningful sentence or paragraph based on his experience expressed in his own words, establishing purpose, developing expectancies for word recognition and meaning through the use of context, and then differentiating the paragraph into its constituent words and word elements. Through grouping of words with common elements, stress is placed upon having pupils learn to conceptualize or to discriminate, abstract, and generalize phoneme-grapheme correspondences, morphemes, spelling patterns, and other units consistent with rules of word recognition and with establishing a set for diversity (Levin & Watson, 1963) or flexibility in word recognition (Singer, 1966).

In essence, the language experience approach maximizes correspondence of the printed message with the language of the reader;

consequently, when he does read, his language competence system is activated, and his comprehension is therefore likely to be optimal (Ruddell 1965a, 1970). At first, the pupil learns to read his own words and then the words of others through an individualized reading program which features self-selection of books or satisfying the individual's curiosity as a motive for reading (Singer, 1965b).

Laboratory Investigations

In addition to experimentation based upon different learning theory models, laboratory investigations, using usually paired-associate types of learning, have been conducted. Under the more carefully controlled condition of the laboratory, albeit a somewhat artificial situation, some questions on learning to read have been studied.

Defining learning to read as decoding print to speech, Gibson divided the process into a sequence of three components: (a) discrimination of graphemes, (b) decoding letters to sounds, and (c) shifting from lower to higher order units or from phoneme-grapheme relationships to spelling patterns, clusters of graphemes in a given environment which have an invariant pronunciation according to the rules of English (Gibson, 1965; Fries, 1962).

Pick (1965) determined that discrimination of letters is initially learned through instructional emphasis upon discovery of attributes or distinctive features of letters by perceiving contrasting pairs of letters. Later, discrimination of letters occurs through the formation of schemas or prototypes, a kind of model or memory image of the letter, built up or stored as a result of repeated presentation of letters. Then, matching sensory experiences to the previously stored concept or model of the letter, the learner can correctly identify the letter.

Transfer seems to depend upon ability to relate oral sounds to graphic configurations at both initial and mature stages of reading. Bishop (1964) found that adults could learn to associate sounds to artificial words through repeating the sounds to the printed words without instruction in the component letter-sound correspondences, but transfer to new words depended upon learning letter-sound correspondences directly through instruction or indirectly by abstracting them in the process of responding to words. Samuels and Jeffrey (1966) reported that kindergarten children taught to recognize a group of words by a phonics method read more new words made up of the same letters, and learned the new word list significantly faster than the experimental look-say group, which performed in the transfer situation about the same as a control group. However, deaf children perform as hearing children do in utilization of pronounceable and unpronounceable spelling patterns (Gibson et al., 1970).

The size and complexity of higher order units, spelling and morphological patterns, increase with development of reading skill.

Gibson, Osser and Pick (1963) compared first and third graders on tachistoscopic perception and spelling recall of pronounceable and unpronounceable trigrams made up of the same letters. The first graders performed better on the pronounceable trigrams while the third graders did equally well on both, but not on longer four or five letter pronounceable pseudo-words. The conclusion was reached that children at the end of first grade tend to read in short units, have already generalized certain regularities of spelling-to-sound correspondence, and by the third grade have increased their span of recognition to four or five lettered words, which involve more complex conditional rules and more complex clusters of spelling to sound correspondences.

In agreement with Fries (1962), Gibson suggested that discovery of these rules might be enhanced if reading materials were programmed according to spelling patterns. Confirming this hypothesis, Skailand (1970) found that low socio-economic kindergarten pupils taught by spelling patterns recalled about twice as many syllables and words than those taught by whole words or single phoneme-grapheme patterns.

The order of ease of perception for words in isolation is first real words, meaningful and pronounceable according to spelling patterns, non-word pronounceable strings of letters, then meaningful but unpronounceable letter strings (Gibson, Bishop, Schiff, & Smith, 1964). But, Gibson (1965) wisely points out that the role of meaning probably increases in sentences in which semantic and syntactic constraints not only make sentences "memorable" and "intelligible," but also serve as "unit formers" for word perception. She is also cognizant that learning to read involves more than just learning three components; particularly, she notes that various strategies have to be evaluated and incorporated into instructional processes and decision-making.

Strategies in Word Recognition

Without guidance or stimulus control, children adopt the strategy of recognizing words by using the easiest cue, which may be an initial letter group, word shape, or any discernible attribute, even an idiosyncratic one or an incidental detail (Samuels, 1970). Pictures associated with words may hinder word recognition development under some conditions for poor readers (Samuels, 1967), but facilitate it under other conditions (Hartley, 1970). Perhaps pictures are useful in the initial stages of learning as a bridge from concrete to symbolic learning, but if not faded out may foster dependence. A developmental test of this hypothesis may be necessary to resolve the apparent discrepancy between Samuels' and Hartley's results. At least, Biemiller (1970) found that oral readers progressed through phases of dependence on context for meaningful guesses, to no response, indicating awareness of graphic features of unknown words and inability to recognize them, and finally to increased skill in using graphic information and subsequently becoming able to integrate graphic information with syntactic and semantic constraints. Because some beginning readers may become too dependent on contextual and picture cues in the initial phase, Biemiller suggests that teachers should promote developmental progress by omitting contextual and picture cues and compelling children to rely upon graphic information as much as possible and adding contextual material as children acquire graphic skills.

Children can be taught to use a particular cue, but not necessarily a relevant one for transfer. For example, when color cues were used in teaching words, children learned to recognize color-cued words more rapidly than non-color cued words. But, when color cues were removed, the children had difficulty in recognizing the words; apparently they had not transferred the color cues to their associated word parts (Samuels, 1968). Samuels and Jeffrey (1966) also found that kindergarten children learned to recognize two letter-dissimilar words such as *mi* and *so* more rapidly than two letter-similar words, such as *me* and *ma*. But, in the transfer situation, the dissimilar group made more errors because they had learned and used only single letter cues. Thus, a strategy for speed of initial learning was not as effective as a strategy for slower rate of learning, but more effective transfer.

Although children learned initially to discriminate letters according to their attributes, the order in which the letters are taught makes a difference in rate of learning. Ackerman and Williams (1969) found that highly similar letters, such as *b* and *d*, were easier to learn to discriminate when taught successively. But for dissimilar letters, such as *s* and *b*, simultaneous discrimination training was easier. Ackerman and Williams reasoned that similar letters presented simultaneously offered so many attributes at one time that acquisition of the discriminating attributes was hindered.

However, for flexibility in responding to printed stimuli when alternate responses are available for a particular grapheme, such as *c*ity and *c*ow, concurrent rather than consecutive training is more beneficial. Williams (1968) reported that fifth and sixth graders in a modified paired associates paradigm could remember multiple correspondences for visual stimuli better when taught concurrently than consecutively. She inferred that readers who could identify graphemes as having multiple responses are more likely to switch to the alternate response when one proved to be ineffective in recognizing the word and are therefore more likely to be successful in reading the word.

Evidence on adult performance in word recognition cannot be generalized to the child beginning to read (Singer, 1970b; Williams, 1970; Samuels, 1970). Williams also points out that laboratory evidence on letters and words in isolation are inadequate because they have not included the linguistic constraints of semantics and syntax. When these linguistic components are included, then hypotheses or cumulative expectancies can be formed as a reader samples the printed stimuli that lead to predictions of words, word meanings, and ideas which are confirmed or disconfirmed by subsequent samples of stimuli (Hochberg & Brooks, 1970).

Questions of motivation on acquisition of reading behavior also need to be investigated. For example, what is the effect of locus of control and self-established goals upon reading acquisition and performance? In a case study, Singer and Beasley (1970) found when they gave a severely retarded reader the opportunity to set his own achievement goal, restructured his learning conditions, for example, by switching from words read per minute to words read per session, so that through expenditure of the necessary effort he could always attain his goal, and provided for feedback and cumulative knowledge of progress, he spent increasingly greater periods of time on reading.

Further experimentation on intrinsic motivation must be undertaken, such as alternating, according to Piagetian theory, a period of assimilation of schemas or recognizing new words which fit under previously induced rules with a period of accommodation or introducing words which do not fit the rule, but instead require a new rule, perhaps a rule involving a high order unit, such as a shift from a phoneme-grapheme to a sound-spelling pattern. Or the shift may be from a graphic stimulus to a context plus a graphic stimulus, which is particularly necessary for determining pronunciation of homographs, such as "They produce food" versus "They take produce to the market." Resolution of such cognitive dissonance or reduction of uncertainty, as well as achieving word recognition expectancies determined by contextual and linguistic constraints, provides internal gratification and reinforcement. It also may establish a *learning set for heirarchial organization*. Furthermore, curiosity aroused by cognitive discrepancies may also foster active perceptual searching, and, if appropriate conditions are provided, result in rule-induction behavior.

Linguistic Models for Reading Instruction

Linguistic models for reading instruction also vary on a decoding to meaning continuum. Towards the decoding end of the continuum, Bloomfield (1942) recommended teaching children first to associate regular spellings with their oral actualizations and then to progress gradually to irregular spellings. Fries (1962), pointing out that spelling patterns have a closer correspondence to oral language than do phoneme-grapheme relationships, advocated teaching reading by presenting contrasting spelling patterns initially only in capital letters and associating the graphic forms with their oral responses.

Defining reading as only decoding print to speech, Reed (1965) argued that traditional phonics and whole word methods are both fallacious because phoneme-grapheme relationships are limited and the whole word method emphasizes meaning, which is not reading, but is a consequence of reading. Instead, Reed employs the hypothetical construct of linguistic form, which links a unit of meaning to a wholly regular physical representation of speech or writing, to explain that written and spoken symbols are associated through identification of their common linguistic forms. Learning to speak consists of acquiring linguistic forms at first through trial and error imitation and memorization and gradually through discriminating, abstracting, and generalizing the regularities in the grammatical and representational systems. For the child who has already learned to speak English, learning to read consists of associating graphic configurations with already known linguistic forms. Reed stresses that only after the child has learned to speak and write his own stock of linguistic forms should he be required to use reading to learn further linguistic forms.

Towards the meaning end of the linguistic models continuum, Chomsky's theory of transformational-generative grammar has been interpreted and applied to reading by several educational researchers, such as Goodman (1968) and Ruddell (1970). Goodman (1970) recently called for a translation of a theory of the reading process into a theory of reading instruction. In this theory, only sketchily presented, meaning is central and the basic unit of instruction is the clause. Because grapho-phonological, syntactical and semantic systems all interact from the beginning of instruction, Goodman points out that sequencing of components is not possible, but control over materials is necessary. If the printed materials are consistent with the child's meanings and use of oral language, then the child should be able to use his linguistic competencies and constraints and redundancies of language for forming expectancies, predicting and confirming meanings; or, if predictions are not confirmed, utilizing strategies for self-correction. Consequently, the beginning reader must already be a competent language user and must have a need to understand printed communication. All of these processes operate as the reader selects cues, decodes graphic stimuli through the interaction of grapho-phonological, syntactic and semantic systems, and transforms the surface structure of the sentence to deep structure, tests the meaning and, if necessary, corrects initial "guesses." Then, when the meaning of the message is determined, encodes his own meaning through graphic or phonological rules for overt expression. Essentially Goodman's theory of instruction for reading is consistent with a field theory of learning and a language experience method of teaching reading.

Thus, like methods of teaching reading, linguistic implications for teaching reading range from emphasis upon decoding of print to speech to emphasis upon meaning at the beginning stages of reading behavior. The controversy involved in the continuum cannot be resolved by arguing that decoding to speech must inlvove meaning because it is possible to recode meaningless sentences from print to speech. Furthermore, as Goodman points out, it is possible to have a grammatical sentence without meaning, but it is not possible to have a meaningful sentence without grammar. Although the language competence of the beginning reader may be involved in instruction throughout the continuum, the models at the meaning end of the continuum are more likely to provide conditions of instruction for activating the language competence of the beginning reader and these facilitate his learning to read.

Whether the controversy needs to be resolved or not depends upon the answer to such empirical questions as do the different theories lead to instructional procedures and consequences that facilitate or impede acquisition of reading ability? Are there differences in cognitive capabilities or styles of beginning readers that are more attuned to one approach rather than another? Some evidence on the effects of different instructional procedures in teaching reading can be adduced that may provide some insight into the issues involved in the controversy.

METHODOLOGICAL EFFECTS ON READING BEHAVIOR

Although there is a hierarchy of skills in learning to read which start to develop at least as early as the child begins to talk, the evidence seems to indicate that training at the kindergarten or first grade level on tasks other than printed stimuli is likely to be less effective than on tasks which involve graphic stimuli. Gates (1926) reported that intercorrelations of perception of geometric symbols, numbers, and words were quite low. Yet, widely used in kindergartens today are materials purporting to prepare children for reading, but based on motor activities (Delacato, 1959; Kephart, 1960) visuo-motor perception (Frostig, 1964), visual analysis and synthesis or "try" tasks (Manolakes, et. al., 1967). Since perception is not a unitary function, and since there is likely to be little transfer from ability to perceive non-printed stimuli to printed stimuli, perceptual training for reading should focus on discrimination, abstraction, and generalization of printed letters and word forms (Singer, 1966, 1970b). Indeed, children apparently do learn some letter names during or prior to kindergarten. At least at the beginning of first grade, children can recognize most of the capital and at least half of the lower case letters (Hildreth, et al., 1965). Consequently, reading readiness testing and its related curriculum, normally begun in first grade, should probably be initiated sooner if children are in fact to be paced rather than forced or delayed in learning to read (Singer, Balow, & Dahms, 1968).

Individual differences in reading achievement at the end of first grade tends to be related to the method of instruction. Gates, Bond and Russell (1939, p. 41) found that the best variables for predicting reading progress in beginning reading were word recognition, ability to complete a partially told story, giving words which end with the same sound as an example, blending word sounds, ability to read letters of the alphabet, and ability to listen, understand, and make use of teacher's instruction. But, they emphasized that "if the teacher effectively emphasizes early phonetic attack, tests of blending, rhyming, etc., are likely to give higher correlations with reading progress in her class than in the teacher's class where less emphasis is placed on the phonetic approach."

Ruddell (1965b, 1968) discovered that programmed instruction was superior to basal or whole word approach on a standardized achievement test at the end of first grade, but at the end of second grade the basal reader approach turned out to be superior. The explanation appears to be that the phonics emphasized in the programmed instruction taught the necessary word recognition skills needed for performance at the end of first grade. However, the more comprehensive set of skills taught by the basal reader and spread over a longer period of time did not pay off until the end of the second grade. Hence, in the initial stages of reading instruction, there are some general factors, such as language and thought which are common to a wide variety of reading tasks. But, there is also a high degree of specificity. Consequently, performance in the initial stages of reading, in part, is a function of what has been specifically taught and emphasized (Singer, 1970a).

Apparently children in general can adapt to a variety of methods of instruction since each method tends to have its own set of effects. Buswell (1922), using an eye-movement camera for assessing symptoms of central mental processes in reading, compared results of a phonic method with a method that emphasized meaning or content. The results indicated that the phonic method tended to promote left to right sequence and word pronunciation, while the meaning emphasis fostered concern for the content, but a slower degree of progress in word recognition and rhythmic eye-movement behavior or sequential reading.

Agnew (1939) reported that differences in methodological emphases resulted in differential effects in oral and silent reading. On word recognition and oral reading, the phonics-emphasis group was superior to the non-phonics emphasis group, but on silent reading, the two groups were about equal. These results suggest that the combination of abilities used or mobilized for oral reading placed a greater premium on a phonics subskill, but for silent reading a quantitatively and/or qualitatively different combination of subabilities was mobilized in which phonic abilities had less weight and other subabilities had greater weight.

A similar conclusion can be reached by careful reading of the largest methodological study ever undertaken in the United States. In this study, Bond and Dykstra (1967) compared five methodological emphases (initial teaching alphabet, basal plus phonics, language experience, linguistic, and phonics combined with linguistics) against a basal reader approach. For comparison criteria, they used word reading, paragraph meaning, spelling and word study skills, as assessed by subtests of the Stanford Reaching Achievement Battery. Although Bond and Dykstra recognize serious methodological flaws in the design of the First Grade Study, such as non-comparable samples, their findings at least suggest hypotheses for further research. In general, Bond and Dykstra found that the non-basal instructional program tended to be superior to a basal program when assessed on the criterion of word recognition skills at the end of the first year of reading. However, when nonbasal and basal programs were compared on the basis of comprehension, the differences were less consistent. The program superior to the basals in development of word recognition skills, as assessed by Stanford "word reading" and Fry's phonetically regular and Gate's random sample of words, were i.t.a., basal plus phonics, linguistic, and phonics-linguistics, but not the language experience approach. The programs that were superior to basals in development of comprehension were basal plus phonics and phonics-linguistic programs. Apparently, more emphasis upon phonics and linguistic elements than usually encountered in a typical basal reader program and inclusion of meaning or connected reading enhances not only word recognition skills, but also comprehension.

From these results we can formulate the hypothesis that the various methods of teaching reading result in readers whose skills on the average are developed differently. In one method, word recognition skills may become initially better developed than word meaning, while in another program the results might be just the opposite. This inference would explain why in some of the First Grade Studies comprehension could still be equal, even though the subskills in the two programs were differentially developed. This hypothesis should, of course, be tested. If a longitudinal investigation could be conducted, using the six stimulus or input emphases or methods of teaching reading on comparable samples, then it would also be possible to test the hypothesis that differential inputs or methods of teaching reading result at least initially in different models or general working systems for attaining speed and power of reading. If this hypothesis is tenable, the next question is whether the differences are lasting or whether convergence of the models tend to occur (Singer, 1968).

But, any method is not equally beneficial for all pupils. Bond (1935) and Fendrick (1935) in a pair of coordinated studies revealed some interaction between method of instruction and modality deficiencies. Children who had a visual handicap tended to achieve better by a phonics method while children with auditory defects tended to learn better by a look-say method. Thus, although children, in general, can adapt to various methods of instruction, some children benefit more when methods are adapted to the hierarchical mode and sequence in which they can learn best.

HIERARCHY OF ACQUISITION OF READING BEHAVIOR

As the learner progresses in reading acquisition, he builds up a hierarchical organization of subsystems (Holmes, 1965; Singer, 1965a). Gagné's (1965) hierarchical model for decoding can be defined as a logically organized input sequence based upon some laboratory evidence and the assumption that oral language development is a necessary prerequisite for acquisition of reading behavior.[2]

Gagné's initial input hierarchy terminates with words that conform to regular pronunciation. The hierarchy starts at the lowest level with reproduction of single letter sounds, an ability which is basic and underlies two branches, one concerned with speaking and learning reproduction of orally presented single syllables and then multisyllabic words. The other branch is a hierarchy for symbol identification and consists first of learning to respond to printed letters by sound; then, pronunciation of single vowels or consonants and diphthongs and alternate phonemic values; next, blending two to three vowel and consonant combinations or syllables, and finally pronunciation of regular spelling patterns with different phonemic values. At the syllable and again at this point the two branches combine. In three more stages, the individual learns first to pronounce printed words composed of closed syllables, then to test cues to match oral reproduction with familiar oral vocabulary, and finally to read words based on regular pronunciation rules.

Later stages of reading consist of learning additional rules for irregularly spelled words. Comprehension, constituting another domain, consists of a series of intellectual tasks, which subsume predicting sequences of thought, detecting irrelevant ideas, formulating the main idea, and inferring meanings of unfamiliar words from context. These components of comprehension, according to Gagné, are learned by practicing reading with a variety of subject-matter content. With greater facility in reading, the reader achieves speed by making better predictions and by sampling stimuli rather than responding to teach printed word. Higher order rules pertain to longer units of discourse, such as paragraphs and chapters. All of the rules or principles are typically learned not by a deductive, but an inductive, discovery method from the act of reading. For various types of reading, the reader must develop particular rules, for example, literary standards for critically reading literature.

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[2] Oral language development as a necessary prerequisite for acquisition of reading behavior may be an unnecessary assumption. Reed (1970) points out that deaf children can learn to relate at least some graphic configurations to linguistic forms *before* they have learned to associate oral expression to these same linguistic forms.

The basic assumption in Gagné's hierarchical organization of decoding behavior is that for ease of learning at each stage there is a particular order of skills which must be acquired in the given sequence. Gagné believes that shortcuts in the hierarchy are accompanied by limitations in ability to generalize the acquired abilities. Learning of component parts of the hierarchy is consistent with his hierarchical order of learning in general, consisting of a conditioning type of learning of word sounds at the base and ending up with problem solving. Involved in this learning hierarchy are all the S-R and field theories of learning.

Complementing Gagné's hierarchical organization of psycholinguistic components for decoding is an organization of mental structures and processes involved in word recognition (Samuels, 1970). The process for developing and using this mental organization starts with a printed stimulus. Through discrimination learning, the individual selects cues and develops responses to them which are stored in long-term memory. Subsequently selected cues go into short-term memory and are recognized through visual processes, perhaps in association with the auditory system. Next the cues enter long-term memory and then are read for "hook-up" with available responses and integrated or blended with previous responses to cues. Response availability may be facilitated through control of context and associative connections between words. Linguistic variables also affect systems involved in learning to read new words, but Samuels does not specify the linguistic variables nor the mental components or processes affected by them. Thus, when the reader has selected and recognized a cue, has the appropriate response available for pairing with the cue, has hooked-up the cue with its response, and blended it with previously paired cues and responses, he is able to recognize or say the word.

Encompassing Gagné's and Samuels' models, substrata-factor theory of reading (Holmes, 1960) postulates that underlying and supporting each component of reading, such as speed or power of reading or underlying each factor, such as word recognition, or each system such as decoding, is a functionally organized hierarchy of interwoven neurological subsystems (Davis, 1964). As an individual learns to read, he gradually develops interrelated subsystems and strategies for decoding, mediational processing, and encoding of responses to printed stimuli. As an individual's subsystems improve in variety, magnitude, and intercommunicability as a result of maturation, learning, and experience in mobilizing subsystems for responding to printed stimuli, he becomes more flexible in organizing and reorganizing his subsystems.

The developmental hypothesis of the theory has been confirmed at the intermediate grade level (Singer, 1965a). Although evidence at the primary grade level appears to be consistent with the hypothesis that different input sequences of instruction will have differential effects upon the acquisition of a hierarchical structure and its relationships for reading, the hypothesis still needs to be tested at this level.

Besides determining the substrata-factors resulting from different input strategies for teaching reading, another question that needs to be answered is whether the various input sequences on the continuum from decoding to meaning eventually result in the same or in quantitatively and/or qualitatively different subsystems for reading. It should also be possible to determine statistically whether one input as compared with another input sequence provides an initial kick that results in a cumulative advantage in reading performance. Further investigation is also needed to determine whether children with different cognitive styles (Tyler, 1969) or ways of perceiving stimuli benefit more from one input strategy than another.

These three sequential models can be conceptually integrated into one stimulus-organismic-response model. Gagné's model emphasizes a logically-determined input hierarchy; Samuels' implicit model stresses the organismic components and processes involved in learning and decoding print to speech. Substrata factor theory, utilizing a statistical procedure for testing hypotheses and for constructing performance models, emphasizes the hierarchical subsystems that can be mobilized in response to the purpose of the reader and the demands of the task-stimuli. This integration, of course, can be empirically tested through a longitudinal investigation at the primary grades by using Gagné's model for determining an instructional input sequence and substrata analysis for empirically constructing the resulting performance model for decoding print to speech. Correspondence between the input sequence and the performance model would tend to confirm the integration of the two models.

SUMMARY AND CONCLUSIONS

Beginning reading instruction in the United States varies along an historically related methodological continuum from emphasis upon decoding print to speech at one end of the continuum to stress upon meaning at the other end of the continuum. The methods involved in this continuum can be categorized into one or the other of the two major classes of learning theories, stimulus-response and cognitive or field theory models.

Methodological and instructional models have tended, at least in the initial stages of reading acquisition, to result in quantitative and qualitative differences in reading performance. Laboratory investigations of reading acquisition have also discovered variations in performance as a consequence of instructional procedures, such as speed of initial learning with little or even negative transfer to a slower rate of learning to recognize printed words but with more positive transfer.

Major components of learning to read have been identified as letter discrimination, decoding to speech, and shifting of perceptual units from phoneme-grapheme relationships to higher order units or patterns that also have an invariant relationship to speech. However, evidence for learning these components, based on laboratory investigations in paired-associate type learning paradigms, is susceptible to modification when the components to be learned are put into sentence context in which syntactic and semantic constraints and redundancies inherent within normal language can function.

Linguistically derived models for the initial stage of reading instruction also vary in emphasis along a continuum. Learning to relate graphic and speech representations of linguistic forms in isolation constitutes one extreme of the continuum. At the other extreme, meaning is emphasized by teaching the child to decode at first graphic representations of his own language, which necessarily involves graphophonological, syntactical, and semantic systems for transforming surface to deep structure, testing meaning, and if confirmed, encoding it for overt expression. Although the language competence of the beginning reader may be involved in instruction at both ends of the continuum, the transformational-generative grammar-determined model, which explicates the structures and processes underlying performance in reading, is more likely than models towards the other end of the continuum to provide conditions of instruction for activating the language competencies of the beginning reader and thus facilitating his reading.

As the learner progresses in reading acquisition, he builds up a hierarchical organization of subsystems. Three models were identified with this hierarchical reorganization and can be conceptually integrated into a stimulus-organismic-response model for learning to read.

Much more research and theorizing needs to be done at the learning to read stage before learning theories and strategies, linguistically-determined units and sequences of instruction, and psychological theories for explaining input, mediational processing, and output response systems can be integrated into a comprehensive theory of instruction. Such a theory would also have to encompass differences in cognitive or perceptual learning styles and decision-making, criteria for determining strategies for achieving various sub-goals in teaching reading, such as a rapid rate of initial success with little transfer versus a slow rate of initial success with a maximum degree of transfer.

Steps towards a comprehensive theory of instruction for teaching reading have already been taken by some researchers, such as Goodman (1970), Coleman (1969), and Bormuth (1969). As theory or theories of instruction develop further, we will be much closer to our ideal of adapting methods and materials to each individual. Consequently, we will then perhaps be able to transform a slogan into a reality, the right of all children to learn to read.

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MODELING READING PROCESSES

This paper was conceived as a very early and brief progress report on that part of the USOE TRDPR: Literature Search which is concerned with models and partial models of the reading process. Additional interim reports are scheduled. It is hoped that each of these reports will aid in keeping the scholarly community informed of our intent and progress to date and will encourage individual scholars to submit their models, ideas and criticisms for review. By establishing such monitoring and feedback circuits, it is hoped that the base of this initial phase of the Right to Read Effort will be broadened to include all interested scholars.

One logical beginning to a project concerned with models of the reading process would seem to be to delimit the area of concern with precise, agreed-upon definitions of what a model is and what is meant by reading processes. Indeed, these questions were discussed at some length at our project conference. I will not review again the difficulties and controversies surrounding any attempt at defining the reading process, but you may be interested to know that these difficulties are matched fully by those surrounding the definition of a model. A cursory look at the literature on modeling leaves the impression that there are as many different kinds of models as there are model builders, as many categories of models as there are models, and at least as many ideas about what a model should be as there are philosophers of science and others interested in the question. A careful reading of this literature confirms this first impression.

There is, of course, a serious literature on the characteristics of models, their relationship to theory, the advantages and disadvantages of their use, and so forth. A good introduction to this literature is contained in Marx (1963). A discussion of modeling specifically in the context of the Right to Read Effort is presented in Gephart (1970). Perhaps Gephart's definition will suffice for our purposes here.

> A model is a representation of a phenomenon which displays the identifiable structural elements of that phenomenon, the relationships among those elements, and the processes involved in the natural phenomenon (p. 38).

Such a model can be a verbal, pictorial, schematic, mechanical, or a combination of these. It can be a physical representation, an analogy, or an isomorph of the phenomenon modeled. It can be classified on a number of other bases. In all cases, however, it serves to make explicit the thinking of the model builder and displays clearly to the knowledgeable reader any areas of vagueness or contradiction. With complex phenomena, a model facilitates thinking about the parts and about the interactions between parts.

The best models for research purposes take on the characteristics of theory, being data based and capable of prediction and testing. Indeed, a considerable portion of the literature on modeling is concerned with the relationship of models to theory. While there is no agreement on this point, I personally like the distinction drawn by Alphonse Chapanis.

> A model is an analogy and no one expects an analogy to be completely accurate. When we use an electronic computer as a model for the brain, we obviously do not mean that our heads are full of transistors, wires, soldered connections, and magnetic cores. . . . Theory, on the other hand, is a conceptual system which attempts to describe the real thing. . . . Whereas a model can tolerate some facts which are clearly not in accord with it, facts which do not agree with the theory are fatal to the theory. . . . Models, in a word, are judged by criteria of usefulness; theories, by criteria of truthfulness (In Marx 1963, pp. 112-113).

Actually, of course, the vagueness of the boundaries of our investigation is an asset in the present situation. It is this vagueness which allows the efforts of a number of scholars from widely varying fields to join forces toward the same end. Any precise (and therefore arbitrary) definition at the outset concerning what we were going to consider a model and exactly which processes are reading-related would risk defining out potentially fruitful sources prior to their examination. For a project whose task is establishing the base for converging lines of research, there could be no more fatal flaw than narrowness at the outset.

Our strategy to insure breadth was to select a reviewing team from widely diverse fields of interest and to turn them loose on the literature with full freedom to go where it took them. The agreed upon research procedure was to concentrate first on models and partial models and the research supporting these models, secondly on research articles not associated with models, and lastly on nonresearch articles of interest. Since the massive body of literature which can be associated with the reading process could not be reviewed in its entirety in a year, it was necessary that each reviewer brought to the task a thorough familiarity with the literature of his speciality.

The Reviewer-Evaluators responsible for models of the reading process are Frederick Davis, Jane Mackworth, Norman Mackworth, Richard Schiffman, Stanley Wanat, and Wendell Weaver. The Review Panel members concerned are Robert Efron, Albert Kingston, Paul Kolers, and Karl Pribram. These scholars come from the fields of neurology, neuropsychology, psychology, psychometrics, linguistics, and education and each has a history of interest in the reading process or in processes clearly related to reading within their specializations.

It was with this background, then, and with considerable interest that I reviewed the output of the Reviewer-Evaluators in mid-November in preparation for this paper. What sorts of studies had this group identified as models and partial models? What kinds of phenomena had they identified as related to reading? How much overlap was there between Reviewer-Evaluators? In short, had the strategy aimed at starting from a maximally broad base worked?

Given clerical and mailing times, the reviews available to me in mid-November represented only those completed by the end of October. Of the reviews completed by this time, eighteen were identified as models, the remainder being almost entirely reviews of research articles. Of these eighteen models, seven were identified specifically with the reading process by their authors. The remaining eleven were considered by our reviewers as being models of reading-related phenomena, attention, etc.

Among the models were verbal, schematic, mathematical and computer-based presentations. As expected the models stem from all the fields represented by the Reviewer-Evaluators and Review Panel members. Within the seven models specifically of the reading process are three with a psychometric and statistical orientation, two with a psychological orientation and an information processing point of view, one within a general psychological framework, and one covering neurophysiological aspects.

As the project shifts from the analysis to the synthesis phase, it is hoped that the models can be arranged in matrices showing possible interrelationships. While I was not able to do this at this early date, certain possible dimensions are already appearing. For instance, nine of the models can be classed within a general information-processing point of view. Included in these are neurophysiological, psychological, linguistic and mathematical levels. On another possible dimension are the five neurophysiological models covering aspects of attention, learning, memory, information processing and reading. As the Reviewer-Evaluators work out their initial areas of interest it is expected that the total range of models will broaden to some degree, but that the significant movement will be toward each other. If this proves to be the case, the construction of matrices of models will be facilitated.

Perhaps the best indication of the breadth of the work to date can be gained from a list of the sources from which these models were obtained. Three models each were obtained from authored books, edited books, and articles in the *Psychological Review*. One model each came from *Psychometrika*, an *IRA Conference Proceedings, Reading Research Quarterly*, an *ARNMD Research Publication*, the *Handbook of Contemporary Soviet Psychology, Science*, an unpublished doctoral dissertation, an invited address before a division of the American Psychological Association, and from a private communication. Ten of the eighteen models were presented since 1969 and the earliest included is dated 1964.

In presenting this overview I have not discussed any of the substantive elements of the models. This task will be left for the Reviewer-Evaluators at an AERA Symposium in February, 1971. Although this report covers a very early stage of the project, the models reviewed to date comprise a considerable corpus of new ideas and approaches to understanding the complexities of the reading process. It will be a fascinating experience to monitor the growth of this corpus and be involved in the search for commonalities and interactions.

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THEORIES OF LANGUAGE DEVELOPMENT AND THEIR RELATION TO READING

The Literature Search in Reading is the second of three projects comprising the Targeted Research and Development Program in Reading, which is a part of the U. S. Office of Education's Right to Read Effort. The Literature Search encompasses three areas: Language development and its relation to reading; the process of learning to read; and the reading process. This paper will deal with the first of these areas.

The objectives of the project in terms of the language area are: (a) To identify all models[1] (or partial models) which describe or purport to explain the behavioral events or operations involved in the process of acquiring language; (b) to ascertain the extent to which hypotheses derived or derivable from the models have been tested; (c) to synthesize the models to produce, insofar as possible the smallest number of logically coherent models, which will account for the maximum number of known facts (i.e., documented through research), and will show precisely where original or replicative studies are needed; and (d) to compare the synthesized model or models with models of the learning to read and the mature reading process in order to show how they may yield fresh insights into the latter processes. For the time being, work in the language area must proceed independently of the other two areas, with much closer coordination during the later stages of the project. To date we have concentrated on two major tasks.[2] To identify all contributions to the literature having to do with language, language development, and especially, language in relation to reading. This phase of our endeavor, which took place during the summer, yielded a total of over 1,000 references. The second task was to identify, describe, and categorize the principal models of language acquisition. The second section of the paper presents a brief description of the principal models. The final section attempts to assess some of the implications for reading, albeit tentatively, since the intermediate step of reviewing the research literature relevant to testing the model is logically prior.

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[1] Gephart's (1970, p. 38) definition has been used as a guideline in identifying models: A model is a representation of a phenomenon which displays the identifiable structural elements of that phenomenon, the relationships among those elements, and the processes involved in the natural phenomenon.

LANGUAGE ACQUISITION MODELS

The traditional ideological split between rationalism and empiricism, which originated in philosophy, found its way into psychology, and has reappeared in the guise of many different controversial issues, is also evident in the different approaches used to explain the phenomenon of language. For a discussion of topical issues related to the rationalist-empiricist dichotomy, see the recent article by Alexander (1970). Psychology's coming-of-age came at a time when empiricism was beginning to gain ascendance. It was almost inevitable that the stimulus-response paradigm which, from its origin as a productive experimental method evolved into the basic explanatory principle for all behavior, should be applied to the interpretation of language.

Briefly, the operant conditioning model, as set forth by Skinner (1966), and Mowrer (1948), when invoked to explain language, relies heavily on the concepts of imitation and successive approximation by means of reinforcement in situations which pair the object or event with its symbolic referent.

This simplistic account first came under fire in Chomsky's review of Skinner's *Verbal Behavior* (1959), in which he posed the basic question: If a child learns language only through the stimulus of hearing sentences spoken around him, and through rewards for correct imitation, how is it that he can speak a sentence he has never heard? Indeed, it seems impossible to construct a probabilistic model that produces all the sentences of English. Chomsky's suggested answer is that every human child is born with some elaborate kind of language-generating capacity and propensity. His theory of syntax (1965) describes language as genetically bound and transmitted through a kind of cultural memory in terms of a set of generative rewrite rules, for the construction of new sentences. Kernel sentences are stored in memory with footnotes to transform the sentences in any way necessary. A sentence has both surface structure and deep structure, the latter consisting of the interpretations of the sentence assigned by transformational rules. Traditional grammars and probabilistic models of language have assumed that meaning is dependent on grammar. In Chomsky's model what is grammatical is independent of what is meaningful.

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[2] The author is indebted to Lynn Lesyk, who compiled a large number of the bibliographical references, and to Sandy Baer, Ann Capling, Mary Culkin, Bonnie Mardis, and Alice Salzberg, who identified the models, and reviewed some of the relevant research literature.

Chomsky's model has aroused much interest not only among cognitive theorists, but also among the behaviorists. Skinner (1966) has retorted that the idea that a child constructs the grammar for himself is as misleading as saying that a dog which catches a ball has constructed the relevant part of the science of mechanics. Yet it is true that people do speak grammatically without being able to describe their grammar, and so, in some sense have implicit rules. Staats (1968) has attempted to counter some of the linguists' criticisms, and to restate the case for behaviorism. Linguistic theory, according to his argument, cannot make explanatory statements, since the linguist is concerned with describing language behavior, and has no contact with its determining conditions. A comprehensive theory of language must tell us how language functions to determine important aspects of human behavior. While linguistics has not concerned itself with these questions, Staats maintains that "integrated learning theory is fully capable of indicating in a credible and useful manner how language behaviors mediate such cognitive behaviors as reasoning, problem solving, intelligence, perception, and so on [p. 158]." The problem of original sentences can be answered in terms of new combinations of learned speech patterns. More recently, MacCorquodale (1969, 1970) has concluded that Chomsky's review "does not constitute a critical analysis of Skinner's *Verbal Behavior* (since) the theory criticized in the review was an amalgam of some other outdated behavioristic lore, including . . . (several) notions which have nothing to do with Skinner's account [p. 98]."

Brown and Bellugi (1967) recognize two processes of language acquisition: imitation and the induction of latent structures. Brown accepts Mowrer's imitation as an explanation of the emergence of correct pronunciation from random babbling. However, this concept is seen as inadequate to account for the child's later linguistic achievements. The child continues to imitate his parents' sentences, but with many of the original words left out, producing what is known as "telegraphic" speech. The word order is preserved, but functional words such as articles, modals, auxiliaries, and inflections, are omitted, possibly due to the limited memory span of children.

After the child has made the reduction of adult speech, he apparently forms generalizations about the syntax or word order , which is preserved. Brown and Fraser (1964, p. 45-47) have shown that even at the two-and three-word sentence level, children maintain a strict grammar, which later becomes more differentiated. That these are generative grammars is evident from systematic errors which are unlikely to be imitations of adult utterances. As Brown points out, generalization of rules is a strong tendency in children. They frequently regularize irregular verbs (i.e. "digged") even though the irregular form is very common. Since rules are apparently more important than practice, it seems likely that children form syntactic rules from their imitation and reduction of adult speech and that these rules lead to the construction of new sentences.

At the same time as the child is learning the use of linguistic forms, pronunciation, and grammar, he is also learning about non-linguistic categories which correspond to names. Like Piaget, Brown believes that the child is learning, even before he speaks or understands language, by handling objects and observing his surroundings. Thus he forms concepts of such universals as space, time, and physical objects. This learning continues throughout life, and is greatly affected by language. He learns to use his knowledge of the environment to form the categories which correspond to names. Unlike the pre-language universal concepts, these referent categories are cultural, since words have different ranges of reference in different languages.

Brown cites evidence that up to adolescence children learn classification in a different way from adults. Their notion of the relationship of subclasses to larger classes is imprecise. They classify in terms of "chain complexes" (i.e., to two objects which have a common characteristic is added a third object having a different characteristic in common with one of the first pair), rather than on the basis of a common denominator. Hence, although the formation of new reference categories goes on throughout the lifetime of the individual, it proceeds differently in childhood.

For Brown, then, the model of language development is intimately bound up with the process of concept acquisition, since the central function of language is to make reference between linguistic and non-linguistic categories. Piaget (1962) likewise, recognizes that any description of the child's language must ultimately be a part of the larger model of the child's developing cognitive organization. The character of language changes as the child's development moves from the sensorimotor to the preoperational and operational stages of thought. The sensorimotor period, is characterized by concrete actions in which the child learns about his world by interacting with it in terms of sensory and motory activity. Although language is not a primary characteristic at this time, clearly this stage lays the foundation for both language and thought.. In the preoperational stage, egocentric speech constitutes almost half of the child's language. The child's use of symbols frees him from dependence on immediate concrete objects, but the symbole are mobile and personal. However, the use of symbols is the first step in the development of representative thought. Socialized speech, which characterizes the operational stages, Piaget sometimes refers to as communicable intelligence, since it reflects the ability to adapt information to the listener's point of view. As the child discovers the need to defend his actions and ideas to himself and others he adapts and organizes his thought and speech to this end. Through repeated attempts to establish new levels of equilibrium, the child develops toward more sophisticated levels of logical, analytical thought characterized by the use of signs which, unlike the earlier symbol, have relatively fixed, interpersonal meaning. For Piaget, language is the vehicle which, through its interplay with the earliest forms of thought, enables the child to conceptualize the world around him, thus arriving at higher forms of representative thought.

Piaget's description of the growth of language may be described as an organismic-developmental model. It has certain features in common with those of Lenneberg (1967) and of Werner and Kaplan (1963). Lenneberg's model has evolved through cross-cultural research and through clinical studies of the effects of retardation, psychosis, and trauma on normal growth.

The organismic-developmental models are based on the conviction that language acquisition has a biological basis. The limits within which the form of any language can be structured, and the sequence in which aspects of language are acquired are determined by genetic factors, as are the child's potential and state of readiness for language acquisition. Language is the result of species-specific cognitive abilities. The cognitive function is basic, language being more dependent on cognititive function is basic, language being more dependent on cognition than *vice versa*. (Much of the recent work toward "visual literacy" supports this assumption.) Maturation of cognitive processes comes about through progressive differentiation of experience, a traversing of highly unstable states whose disequilibrium leads to rearrangements of the elements of thought, adult thought being characterized by relatively stable arrangements.

Lennenberg cites evidence that acquisition of language follows certain developmental stages, which emerge as the result of the interaction of maturation with preprogrammed learning.

> The first feature of natural language to be discernible in a child's babbling is contour of intonation. . . . The linguistic development of utterance does not seem to begin by a composition of individual, independently movable items, but as a whole tonal pattern. . . . The acoustic shape is only a crude replica of the adult word, and it is only by means of our capacity

> to see pattern similarities that we can recognize the child's word. This is common enough knowledge. But perhaps it has not been sufficiently stressed that it is not merely the adult who must be able to equate the child's utterance to an English word; the child himself must have similar skills in pattern recognition and equation. For almost a year children are satisfied with general pattern similarity and dispense, so to speak, with segement by segment phonetic identity. Surely this has to do with their initial circumstances, and thus with maturational factors . . . the infant's initial lack of concern for phonetic accuracy is by no means a trivial or logically necessary phenomenon. It points to a fundamental principle in language acquisition; what is acquired are patterns and structure, not constituent elements. (In Blumenthal, 1970, pp. 226-227)

For Lenneberg, the sentence is the unit of discourse, and the one-or-two-word sentences, which are not only the first manifestations of child speech, but also occur in adult speech, are simply elliptical sentences whose meaning is uninterpretable unless the social context provides enough clues to reconstruct a sentence from those words, e.g. when the child utters the word "Daddy", this isolated word may carry the meaning "Daddy is coming" or "Daddy, pick me up", depending on the intonation and accompanying gestures. Thus, our ability to understand many utterances which are not grammatically correct depends on the degree to which they conform to a limited set of admissible rules. The paradox is this: If the child's task is to abstract principles that generate correct sentences, but he is presented indiscriminately with semi- and proper-sentences, how can the correct principles be established? The answer seems to be that they come to be established by virtue of the child's developing ability to categorize. Syntactic categorization is the speaker's act of superimposing structure; he assigns lexical items to parts of speech. The child's syntax is primitive because all of his words have the same syntactic function. Any word whether verb, noun, or adjective may stand for a complete sentence. With the advent of two-word sentences, however, there is the suggestion of a primitive subject-predicate distinction, since one of the words often functions as a pivot word. Longer sentences may be seen to consist of the pivot word plus elaborations on the second word in the form of modifiers.

Lenneberg concludes that:

> We are discovering a basic process that is reflected in language as well as in many other aspects of behavior. It consists of first grasping a whole that is subsequently further differentiated, each of the specifics arriving at a different time and being subordinated to the whole by a process of temporal integration. In productive behavior a plan for the whole is differentiated into components, and the temporal integration results in order-

> ing of movements (or thoughts). Organization of phrase structure with the resulting phenomenon of recursiveness and nested dependencies appears as a "natural phenomenon" once we assume that a ubiquitous process is influencing a specific behavior. (In Blumenthal, 1970, p. 236)

A descriptive model of language acquisition, if it is to be adequate, cannot avoid examining the relationship between language and thought. In his book *Language and Thought,* Carroll (1964) accepts Piaget's definition of a concept as an internal representation of a certain class of experiences which may be attained without the use of language. A child may, of course, use a label inappropriately, but once he is able to use a word to refer to the same class of experiences as do the members of his speech community, he may be said to have acquired the concept. One function of linguistic forms is to alert the listener to the existence of a possible class of experiences, but "a label is not particularly useful when it does not readily refer to a well-learned class of experiences [p. 97]." Most languages, whether natural or artificial, provide sufficient words to catalog or describe nearly all of the experiences that occur to users of the language. Carroll finds that, while vocabularies differ in size depending on the state of advancement of the civilization, the "core vocabularies" of all languages are roughly of the same order of magnitude, around 10,000 words, reflecting certain uniformities of the physical and biological environment of mankind. Having names for things does not seem to increase the capacity for discrimination, but it does seem to enhance the ability to recognize and identify particular discriminations from memory. The existence of different words for different categories draws attention to those categories, thus making the differences between stimuli more salient or noticeable.

It is at the stage of grammatical construction that language structure begins to aid in thinking, beyond what could happen without language. Carroll uses the term "reasoning" to describe thinking aided by language, and maintains that the ability to reason depends largely on the ability to formulate steps in an inferential process in terms of language.

Carroll summarizes the relationship between language and thought in these words:

> Human beings, from an early age, develop internal processes that represent sensations and perceptions in such a way that they can be stored in memory, and later brought back into consciousness and manipulated in the absence of the stimuli that originally evoked them. The language of a given social environment exhibits a relationship to the internal processes of the language users in their transactions with their environment. As the child assimilates the structure of his language, his inter-

> nal processes become more and more like those of the speech community, insofar as these processes are represented by language. Thinking is the conscious or unconscious manipulation of internal processes usually toward the solution of some problem, while communication seeks to arouse certain internal processes in the hearer. Language thus figures prominently in thinking. The concepts named by language symbols are tools of thought in that they are mediating responses which bridge the stimulus-response gap and represent organizations of internal processes acquired through past experience. (p. 110)

These concepts are coded linguistically and are important in the solution of problems. In fact, the individual's repertoire of concepts and his skills in manipulating them will determine in large measure his facility in coping with the problems of his environment.

A brief exposition of some of the major models of language acquisition has been presented here, but there are many other less comprehensive models which may have implications for reading and will be considered in the course of this year-long investigation. No attempt has been made to present models of the reading process such as those of Goodman, Ruddell, Singer, Venezky and Calfee, etc. (In Singer and Ruddell, 1970), but a later phase will need to study points of comparison and possible integration of these with models of language acquisition.

IMPLICATIONS FOR READING

It may well be premature to attempt to extract implications for reading from the language models described, prior to an examination of the extent to which each model is supported by experimental evidence. It is tempting, however, to consider a few implications which seem to follow readily from the models, taken separately or together.

1. Operant conditioning models have traditionally been weakest in specifying amount, timing, and kind of reinforcement appropriate to learning particular tasks. Skinner's latest book (1969) does specify contingencies of reinformenemt, but makes little reference to language behavior as such. The concept of programmed learning which follows from this model would suggest that reading instruction start with simple units such as letters or words before proceeding to larger units such as sentences.
2. Cognitive models usually propose a biological basis to account for the developmental order of appearance of language. One observable aspect of the development of linguistic forms is that the child's comprehension of linguistic form precedes and exceeds his production of these forms (Chomsky's competence-performance distinction). This suggests that nonverbal children need help in verbalizing their understandings, i.e. in assigning "constituent structures", in Miller's

term, to their utterances. For example, the constituent structure of an ambiguous sentence may become apparent only through questions. The teacher can help the child to clarify his understanding and speech by asking, and by encouraging the child to ask himself, appropriate questions. In effect, this is the kind of tacit questioning which occurs in that psycholinguistic guessing game Goodman calls reading.

3. All theorists are convinced of the close relationship between language and thought, whether thought is defined in terms of mediating responses, discriminations, internal schemas, etc. Since most theorists agree that some classification can precede language, children can be helped even from infancy to pay attention to discriminating features of the environment, and to classify stimuli in ways appropriate to their speech community.
4. It seems necessary, if the child is to learn to read standard English, that he be exposed to, and interact with, adults and children who use standard English. If the home uses a foreign language or dialect, the young child learns which set of language behaviors is appropriate to which situation. Lenneberg's work would suggest that these models are particularly crucial during the age range 2 to 4 years, the period of greatest activity in language development.
5. Piaget's theory suggests that abstract symbols are meaningless to children unless they have an experiential background which, as Brown would say, links the symbols to their nonreferent objects. Elkind (1970) has hypothesized that the child is not ready to read until his perception is decentered and his thought is operational. Until the child can grasp the essential phoneme-grapheme relationship, any appearance of reading is rote verbalization. Again this suggests that maturation is an important factor in reading, but that maturation is triggered by the experiences necessary for the child to establish concepts which are more than empty verbalizations. One may asky why reading should be taught at an age when the best learning comes through experience not through abstract symbols.

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CORRELATIONAL AND FACTOR ANALYSIS OF CRITICAL READING AND THINKING TEST SCORES–TWELFTH GRADE

Critical reading and critical thinking are constructs which have received attention for years even though their definitions and relationship have been vague and unclear. There has been an abundance of definitions both of critical reading and critical thinking which has resulted in considerable confusion, uncertainty, and ambiguity. The ambiguity and confusion characterising the definition of critical reading is apparent from the Wolf, Huck, King, Ellinger, and Gansneder (1967) review of the critical reading literature. Gainsburg (1961) among others, asserts that the term critical reading is not sufficiently accurate to describe its nature. The ambiguity, uncertainty, and confusion characterising the definition of critical thinking have been noted by Rust (1960), Ennis (1962), Penfold and Abou-Hatab (1967), and Follman (1969). Wolf, et al (1967) recently provided evidence that critical reading consists of a number of skills. Follman (1969) in a factor analytic study found that critical thinking also was a composite of specific skills.

There is still little knowledge of the relationship between critical reading and critical thinking. The principal reason is probably the paucity of critical reading tests about which much is known, Denberg and Jones (1967) and Trela (1967). Many scholars including Gainsburg (1961), Simmons (1965), and Wolf, et al (1967) have contended that there is substantial overlap between critical reading and critical thinking. However, apparently the only empirical evidence of this overlap is a correlation of .77 on twelfth grade pupils' scores between the *Watson-Glaser Test of Critical Thinking* and the *Martin Reading Comprehension Test* described by Glaser (1941) as a test of critical reading.

The objectives of this study were to determine empirically the phenotypic interrelationships and factor structure of critical reading and critical thinking tests and subtests from which genotypic inferences could be made.

This study reports the primary statistical analysis of a twelfth grade data collection, half of a research program examining empirically the definition of critical reading. The other half of the research program was a fifth grade data collection.

PROCEDURE

The subjects (Ss) were 57 twelfth grade students at Robinson High School, Hillsborough County Public Schools, Tampa, Florida. The students were selected by the school administrators and teachers to represent the range of ability characteristic of their twelfth grade students.

One critical reading test, *Reading Comprehension Test (CR)* (Martin, 1939), one critical thinking test, *Test of Critical Thinking Form G (CT)* (American Council on Education, 1951), one reading test, the *Nelson-Denny Reading Test Form A (READ)* (Brown, 1960), and one intelligence test, *The Lorge-Thorndike Intelligence Tests Form A (IQ)* (Lorge and Thorndike, 1954), were administered in December, 1969.

The Ss had already taken the *Florida Statewide Twelfth Grade Tests Form PRT* (Swineford, 1968).

The tests provided the following scores.

Test of Critical Thinking Form G (CT)
  Pertinent Information (PERT INFO)
  Valid Inferences 1 (VAL INF 1)
  Valid Inferences 2 (VAL INF 2)
  Relevant Generalizations (REL GENS)
  Recognition of Assumptions (RECOG ASSMUP)
  Valid Inferences 3 (VAL INF 3)
  Valid Inferences 4 (VAL INF 4)
  Hypothesis Vertification 1 (HYP VER 1)
  Hypothesis Verification 2 (HYP VER 2)
Nelson-Denny Reading Test (READ)
  Vocabulary (VOCAB)
  Comprehension (COMP)
The Lorge Thorndike Intelligence Tests (IQ)
  Vocabulry (VOCAB)
  Sentence Completion (SENT COMP)
  Arithmetical Reasoning (ARITH REAS)
  Verbal Classification (VERB CLASS)

- Verbal Analogies (VERB ANAL)
- Figure Classification (FIG CLASS)
- Number Series (NO SERIES)
- Figure Analogies (FIG ANAL)

Reading Comprehension Test (CR)
- Main Points (MAIN PTS)
- Specific Facts (SPEC FACTS)
- Cause and Effect Relationships (CAUSE EFFECT)
- Inference (INFERENCE)
- Vocabulry (VOCAB)

Florida Statewide Twelfth Grade Tests (FLA)
- Verbal (VERB)
- Quantiative (QUANT)
- English (ENGLISH)
- Social Science (SOC SCI)
- Natural Science (NAT SCI)
- Mathematics (MATH)
- Reading Index (FLA READ INDEX)

Pearson product moment correlations were calculated to determine the subtest score matrix, and the total test score matrix, independently. Principal components factor analysis and Kaiser Varimax rotation of all factors with eigenvalues in excess of one were conducted for the subtest score matrix, and the total test score matrix, independently.

RESULTS

Table 1 indicates the intercorrelations for the 33 subtests.

Ns ranged from 57 to 51 for the different correlations as not all students took all subtests. Ns, means, and standard deviations for the 495 correlations are not presented because of space limitations. These data are available upon request.

A correlation of .28 is significant at the .05 level and a correlation of .36 is significant at the .01 level for an N of 51, the smallest N.

The nine CT subtests generally intercorrelated low or moderately. In general the CT subtests correlated low to moderately with the CR subtests, the reading and the IQ verbal subtests, low with the IQ non-verbal tests, and moderately with the FLA achievement tests, although VAL INF 2 and RECOG ASSUMP correlated somewhat higher.

READ VOCAB correlated moderately to high with nearly all variables except CT PERT INFO, CT VAL INF 1, CT HYP VER 2, and the non-verbal subtests. READ COMP correlated similarly except for low correlations with more CT subtests. The two subtests correlated high.

Three of the five IQ VERB subtests, IQ VOCAB, IQ SENT COMP, and IQ VERB ANAL correlated similarly, high with each other and most other variables, moderately with most CT and CR subtests, moderately to high with the FLA achievement subtests, high

Table 1

Subtest Intercorrelations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1 CT PERT INFO																															
2 CT VAL INF 1	-.05																														
3 CT CAL INF 2	.15	.50																													
4 CT REL GENS	.06	.28	.30																												
5 CT RECOG ASSUMP	.17	.16	.43	.30																											
6 CT VAL INF3	.12	.15	.30	.30	.26																										
7 CT VAL INF 4	.14	.18	.41	.36	.53	.44																									
8 CT HYP VER 1	.29	.36	.46	.41	.44	.41	.45																								
9 CT HYP VER 2	.22	.21	.33	.14	.34	.23	.27	.51																							
10 READ VOCAB	.19	.33	.44	.60	.52	.42	.48	.37	.28																						
11 READ COMP	.17	.30	.42	.44	.53	.28	.38	.24	.17	.76																					
12 IQ VOCAB	.27	.19	.50	.47	.63	.39	.58	.32	.16	.80	.72																				
13 IQ SENT COMP	.40	.23	.53	.33	.50	.46	.48	.37	.22	.63	.54	.67																			
14 IQ ARITH REAS	.22	.23	.42	.28	.44	.35	.49	.42	.38	.35	.30	.39	.46																		
15 IQ VERB CLASS	.30	.25	.55	.03	.44	.28	.36	.38	.34	.50	.55	.52	.54	.30																	
16 IQ VERB ANAL	.43	.22	.50	.36	.48	.50	.42	.46	.31	.77	.63	.70	.69	.43	.56																
17 IQ FIG CLASS	-.11	.18	.29	.08	.16	.31	.26	.35	.17	.07	.02	.10	.05	.44	.20	.13															
18 IQ NO SERIES	.26	.16	.22	.25	.15	.33	.25	.41	.12	.39	.32	.30	.41	.35	.35	.52	.50														
19 IQ FIG ANAL	.07	.29	.20	.08	-.09	.21	.06	.27	.24	.02	-.11	-.09	.16	.31	.19	.18	.46	.30													
20 IQ VERB	.40	.28	.63	.38	.64	.49	.60	.49	.35	.78	.71	.87	.83	.63	.74	.86	.23	.48	.16												
21 IQ NON VERB	.11	.29	.29	.17	.06	.35	.21	.43	.24	.18	.06	.09	.27	.45	.31	.34	.77	.71	.84	.35											
22 CR MAIN POINTS	.23	.27	.46	.31	.56	.18	.31	.30	.29	.39	.38	.42	.53	.45	.34	.43	.05	.05	.10	.54	.09										
23 CR SPEC FACTS	.22	.17	.47	.36	.51	.29	.33	.23	.08	.41	.43	.50	.62	.23	.34	.42	-.04	.21	-.03	.53	.05	.71									
24 CAUSE EFFECT	.30	.13	.45	.49	.57	.23	.33	.28	.17	.58	.53	.67	.65	.37	.34	.55	.13	.27	.00	.66	.14	.64	.70								
25 INFERENCE	.37	.10	.36	.42	.48	.19	.27	.41	.38	.48	.36	.44	.52	.46	.31	.48	.03	.39	.08	.55	.21	.57	.61	.61							
26 CR VOCAB	.35	.16	.36	.50	.47	.32	.47	.30	.14	.58	.49	.65	.63	.26	.29	.58	-.04	.26	-.01	.62	.08	.60	.74	.69	.56						
27 FLA VERB	.28	.26	.48	.28	.54	.50	.46	.38	.35	.71	.62	.66	.61	.44	.65	.73	.23	.37	.15	.79	.30	.54	.44	.48	.41	.62					
28 FLA QUAN	.35	.16	.43	.27	.38	.43	.49	.48	.39	.53	.40	.51	.50	.59	.50	.61	.28	.44	.23	.69	.39	.54	.39	.46	.46	.53	.70				
29 FLA ENG	.28	.30	.50	.52	.57	.43	.47	.43	.19	.78	.65	.75	.53	.35	.41	.61	.20	.36	-.05	.69	.17	.45	.44	.63	.40	.61	.70	.58			
30 FLA SOC SCI	.33	.13	.59	.40	.54	.43	.42	.43	.35	.66	.60	.66	.76	.45	.63	.74	.17	.47	.14	.82	.32	.59	.55	.61	.50	.61	.75	.67	.60		
31 FLA NAT SCI	.33	.36	.65	.39	.36	.45	.52	.42	.35	.66	.56	.67	.74	.41	.61	.66	.12	.34	.24	.79	.31	.54	.53	.56	.46	.67	.78	.72	.64	.81	
32 FLA MATH	.25	.27	.57	.24	.33	.41	.46	.50	.47	.49	.45	.47	.52	.56	.56	.60	.35	.51	.35	.68	.51	.49	.38	.44	.41	.46	.66	.87	.53	.70	.77

with reading subtests, and low with non-verbal subtests. The other two IQ VERB subtests, IQ ARITH REAS and VERB CLASS correlated low to moderately with nearly all variables. The three IQ nonverbal subtests, FIG CLASS, NO SERIES, and FIG ANAL had generally low correlations and some moderate ones with most other variables, and moderate intercorrelations.

The CR subtests correlated consistently low to moderately with the CT subtests, moderately with the READ and IQ VERB subtests, low with the IQ NON VERB subtests, and moderately to high with each other and the FLA subtests.

The FLA subtests correlated low to moderately with the CT subtests, moderately to high with READ and IQ VERB and each other and low with the IQ NON VERB subtests.

Table 2 indicates the subtests' means, standard deviations, unrotated and rotated factor loadings, percent of variance accounted for by each factor, and eigenvalues (N = 50).

Factor analysis indicated a general factor accounting for about 46% of the total variance with only two variables (nonverbal) having loadings less than .36. This factor apparently consists of language, reading, thinking, vocabulary, and verbal activities.

The second factor was a non-verbal variable.

Factor 3 represents critical reading activities.

Factor 4 represents critical thinking activities.

Factor 5 apparently involves language categorization activity.

Factor 6 and 7 are essentially uninterpretable.

Rotation sharpened the factors identified in the factor analysis. The large group factor had strong loadings from fewer tests, with 12 loadings below .36 instead of two as in the factor analysis. This is demonstrably a verbal, language factor particularly vocabulary. The loadings of .59 of FLA QUAN and .61 of FLA MATH merely document the well known substantial amount of verbal variance involved in these alleged non-verbal tests.

The non-verbal factor identified in the factor analysis was more clearly delineated in the second factor with loadings of .86 from IQ FIG CLASS, .74 from IQ NO SERIES, .54 from IQ FIG ANAL, .50 from IQ ARITH REAS, and .37 from FLA MATH.

Factor 3 is empirical evidence for a relationship between critical reading and critical thinking with loadings from all five CR subtests and three CT subtests and a few other subtests. The relationship encompasses such activities as judgment about the relationship of statements to conclusions, accuracy of interpretation of information, and interpretation of the assumptive nature of statements.

The strong loadings of the CR subtests are evidence that CR represents rather specific, unique activities in association with some

Table 2
Subtests, Means, Standard Deviations, Unrotated and Rotated Factor Loadings

	$\overline{X}$	SD	Unrotated							Rotated						
			1	2	3	4	5	6	7	1	2	3	4	5	6	7
CT PERT INFO	4.36	1.79	.41	-.14	-.47	.42	.13	.07	-.23	.18	-.03	-.36	.19	.07	.19	-.65
CT VAL INF 1	1.38	1.03	.36	.19	.19	-.60	.14	-.42	-.24	.16	.03	-.12	-.81	.27	.11	.21
CT VAL INF 2	2.92	1.61	.71	.13	-.01	-.35	-.22	-.11	-.07	.52	.11	-.36	-.42	-.05	.31	.13
CT REL GENS	2.50	1.36	.55	-.08	.19	-.13	.64	-.04	-.11	.23	.06	-.21	-.19	.79	.17	-.05
CT RECOG ASSUMP	6.02	1.81	.70	-.18	-.01	-.35	-.07	.29	.33	.44	.04	-.55	.10	.14	.37	.42
CT VAL INF 3	1.24	1.14	.55	.31	.32	.27	-.01	.08	-.25	.63	.25	.21	-.08	.18	.21	-.22
CT VAL INF 4	.98	1.00	.65	.15	.19	-.04	-.12	.32	.03	.60	.16	-.09	.06	.09	.40	.14
CT HYP VER 1	5.90	2.07	.59	.42	-.07	-.15	.32	.23	-.14	.25	.28	-.08	-.18	.34	.64	-.10
CT HYP VER 2	2.58	2.13	.43	.34	-.29	-.28	.07	.47	-.28	.14	-.01	-.09	-.12	.04	.85	-.08
READ VOCAB	32.26	13.63	.81	-.19	.36	.00	.18	.05	-.07	.72	.02	-.23	-.05	.51	.10	.05
READ COMP	20.74	5.78	.75	-.28	.35	-.11	.01	.01	.04	.70	-.04	-.32	-.06	.36	.02	.21
IQ VOCAB	15.04	4.53	.81	-.29	.30	.07	-.04	.07	.10	.78	.03	-.35	.10	.30	.01	.12
IQ SENT COMP	8.16	2.28	.80	-.12	-.07	.16	-.11	-.19	-.06	.64	.12	-.47	-.12	.08	.04	-.24
IQ ARITH REAS	8.40	3.01	.59	.39	-.18	-.09	.03	.16	.28	.26	.50	-.31	-.01	.03	.48	.07
IQ VERB CLASS	13.90	3.16	.68	.06	.06	-.06	-.45	-.07	-.01	.68	.13	-.28	-.19	-.23	.14	.07
IQ VERB ANAL	9.28	3.28	.83	-.04	.11	.21	.05	-.05	-.06	.70	.19	-.31	-.04	.28	.11	-.20
IQ FIG CLASS	13.02	3.70	.26	.73	.14	.00	-.02	-.10	.48	.11	.86	.07	-.11	-.06	.17	.23
IQ NO SERIES	13.52	4.48	.50	.37	.10	.40	.29	-.23	.31	.29	.74	-.12	.03	.30	-.05	-.22
IQ FIG ANAL	19.34	6.83	.18	.68	-.19	-.01	.04	-.46	-.14	-.04	.54	.04	-.58	-.12	.13	-.31
CR MAIN POINTS	3.48	1.46	.68	-.18	-.43	-.29	-.15	-.11	.06	.30	-.02	-.77	-.21	-.08	.27	-.02
CR SPEC FACTS	12.90	2.59	.67	-.38	-.31	-.10	-.02	-.25	.13	.33	-.03	-.80	-.10	.09	-.02	-.08
CR CAUSE EFFECT	3.86	1.44	.75	-.31	-.16	-.02	.13	-.16	.25	.40	.13	-.73	.01	.27	.00	-.02
CR INFERENCE	6.28	2.18	.66	-.09	-.46	-.03	.34	.09	.11	.13	.15	-.67	.06	.31	.39	-.23
CR VOCAB	11.36	3.07	.76	-.35	-.13	.09	.12	-.13	-.05	.51	-.05	-.60	-.03	.29	.03	-.24
FLA VERB	27.64	8.33	.86	-.01	.15	.05	-.20	.02	-.06	.81	.13	-.30	-.10	.08	.19	-.03
FLA QUAN	29.00	8.67	.78	.22	-.15	.20	-.11	.15	-.01	.59	.31	-.30	.05	-.02	.41	-.24
FLA ENG	51.00	13.64	.79	-.15	.30	.02	.11	.08	.03	.70	.08	-.27	.01	.42	.13	.08
FLA SOC SCI	38.42	11.35	.86	-.03	-.05	.17	-.16	-.02	-.02	.72	.18	-.42	-.03	.04	.18	-.19
FLA NAT SCI	32.64	10.44	.87	.00	.00	.10	-.19	-.12	-.28	.78	.05	-.33	-.25	.04	.19	-.28
FLA MATH	24.14	11.78	.78	.35	-.12	.11	-.19	.04	-.07	.61	.37	-.24	-.15	-.09	.41	-.21
% of σ^2 accounted for			45.79	8.68	5.59	4.74	4.29	3.93	3.44	35.63[a]	10.55[a]	20.31[a]	6.72[a]	8.96[a]	11.52[a]	6.31[a]
Eigenvalues			13.74	2.60	1.68	1.42	1.29	1.18	1.03							

[a] % of σ^2 of these seven factors accounted for by these seven factors, not % of total σ^2.

critical thinking activities, but distinct from verbal ability, reading ability, and probably intelligence.

Factor 4 is difficult to interpret but apparently involves language interpretation and categorization.

Factor 5 apparently is focally involved with understanding of language.

Factor 6 has strong loadings of .85 from CT HYP VER 2 and .64 from CT HYP VER 1 but may actually represent the same unique subtest content for both subtests, rather than some identical underlying activity, i.e., hypothesis verification.

Factor 7 has a strong loading from CT PERT INFO and involves judgment whether a statement does or does not support a given conclusion.

Table 3 indicates the total test score correlations for CT, READ, IQ, CR, and READ INDEX.

Table 3
Total Test Score Correlations

	CT	READ	IQ	CR
CT				
READ	.62			
IQ	.70	.60		
CR	.62	.59	.51	
READ INDEX	.72	.81	.72	.69

All correlations significant at .01 level.

Ns for these correlations were 55, 53, 57, 55, 52, 55, 53, 53, 51, and 55 respectively. Means and standard deviations are available upon request.

The total test score correlations indicated substantial common variance between CT, READ, IQ, CR, and READ INDEX.

Table 4 indicates total test score means, standard deviations, unrotated and rotated factor loadings, %s of variance accounted for by each factor and eigenvalues.

Factor analysis indicated a general factor accounting for 74% of the variance consisting of strong loadings from all total test scores. Presumably this factor represents common language variance. The second factor had moderate loadings from IQ probably reflecting IQ's non-language component, and variance measured by some of the CR subtests.

Rotation split the general factor. One factor consisted essentially of CR and also variance from READ INDEX, READ, and CT. The other factor consisted essentially of IQ with variance also from CT,

Table 4
Total Test Score Means, Standard Deviations, and Unrotated and Rotated Factor Loadings (N = 50)

			Unrotated		Rotated	
	$\bar{X}$	SD	1	2	1	2
CT	27.88	8.80	.87	.11	.54	.69
READ	53.00	18.51	.86	–.09	.68	.54
IQ	100.66	20.21	.83	.48	.25	.92
CR	37.38	9.16	.81	–.47	.90	.24
READ INDEX	72.16	18.75	.93	–.04	.69	.63
% of σ^2 accounted for			74.20	9.28	50.39[1]	49.61[1]
Eigenvalues			3.71	.46		

[1] % of rotation σ^2 accounted for, not % of total σ^2.

READ INDEX, and READ. It accounted for only nine percent of the total variance. Finally factor analysis of only five variables has limited meaning, and that heuristic meaning, if its results are consistent with the subtests' analyses.

Conclusions

Critical reading has substantial overlap with reading, thinking, and language activities, particularly vocabulary and some critical thinking activities. Language ability in general and vocabulary ability in particular is seen as basic to critical reading.

There is overlap between critical reading and critical thinking. This overlap represents substantially what CR measures and is in addition to language ability and is distinct from a number of other rather specific thinking activities.

Critical thinking consists of some activities separate from the other thinking, language, non-language, and critical reading abilities.

Additional analyses of the critical reading and critical thinking tests and subtests are suggested, particularly inter-item correlations, factor analysis and rotation, and first and second order partial correlation, and canonical correlation.

A final caveat, the validity of any correlational and factor analytic study depends upon the reliability and validity of the tests and subtests used.

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CANONICAL AND PARTIAL CORRELATION OF CRITICAL READING AND CRITICAL THINKING TEST SCORES—TWELFTH GRADE

This study is the second in a series of three statistical analyses of critical reading and critical thinking test scores of twelfth grade students. In the first analysis of the twelfth grade data it was concluded that critical reading overlaps substantially with reading, thinking, and language activities particularly vocabulary and that there is considerable overlap between critical reading and critical thinking (Follman, Lowe, and Wiley, 1971).

The purpose of the present study is to examine through partial correlation and canonical correlation the definition of critcal reading and also the relationship between critical reading and critical thinking found in the previous study.

Partial correlation was used to hold constant respectively, intelligence, reading, and intelligence and reading together. It was anticipated that low to moderate significant correlations would obtain between critical reading and critical thinking with intelligence and/or reading partialled out. Such corrleations would be prima facie evidence of overlap variance between critical reading and critical thinking with intelligence and/or reading ability removed.

Canonical correlation was used to determine the maximum relationships among five sets of subtests: critical reading; critical thinking; reading; and two sets of reading, language and achievement subtests. It was anticipated that high significant canonical correlations would obtain in all comparisons. Such correlations would be prima facie evidence of large overlap presumably language ability.

PROCEDURE

The subjects (Ss), typical twelfth grade pupils from Robinson High School, Hillsborough County, Florida, were tested in the fall of 1969. The Ss were predominately white, upper lower and lower middle class.

Partial correlations, second order partial correlations, and canonical correlations were computed to determine the relationships between various combinations of subtests.

Ns were 52 and 50 in all analyses.

[See page 131 for listing of tests and abbreviations used in this paper.]

RESULTS

Table 1 indicates the first and second order partial correlations (and zero order correlations) with respectively IQ VERB, IQ total, READ VOCAB, READ total, READ INDEX, IQ VERB and READ VOCAB together, IQ VERB and READ total together, IQ total and READ VOCAB together, and IQ total and READ total together, held constant.

Table 1

First and Second Order Partial Correlations

	Correlates	(Zero Order Correlations)	Partialled Variable (s)	Partial Correlation
FIRST ORDER	CR, READ VOCAB	(.58)	IQ VERB	.07
	CT, READ VOCAB	(.62)	IQ VERB	.14
	CR, READ	(.59)	IQ VERB	.12
	CT, READ	(.62)	IQ VERB	.11
	CR, CT	(.62)	IQ VERB	.23*
	CR, READ	(.59)	IQ	.43**
	CT, READ	(.62)	IQ	.40**
	CR, CT	(.62)	IQ	.44**
	CR, CT	(.62)	READ VOCAB	.44**
	CR, CT	(.62)	READ	.42**
	CR, CT	(.62)	READ INDEX	.28**
SECOND ORDER	CR, CT		IQ VERB, READ VERB	.25*
	CR, CT		IQ VERB, READ	.22
	CR, CT		IQ, READ VOCAB	.25*
	CR, CT		IQ, READ	.32**

* Significant at the .05 level.
** Significant at the .01 level.

The first order partial correlations with IQ VERB partialled out were all low and non-significant except one which while significant was low, .23. This is interpreted to mean that little common variance remains with critical reading and reading vocabulary, with critical thinking and reading vocabulary, with critical reading and reading, with critical thinking and reading, and crucially with critical reading and critical thinking, respectively, after verbal intelligence has been removed.

The first order partials with IQ total, and READ VOCAB, READ total, and READ INDEX respectively removed though significant were relatively weak. This may be interpreted to mean that some common variance may remain with critical reading and critical thinking, after intelligence total, and reading was removed, more variance than remained when verbal intelligence was removed.

The first order partial correlations with IQ VERB or READ INDEX partialled out where all substantially lower than the first order partials with IQ total including IQ non-verbal variance partialled out. The difference in strength is so great that the inference is inescapable that verbal ability is heavily involved, nearly isomorphically with reading, critical thinking, and critical reading. Apparently READ VOCAB and READ total includes some variance different from IQ VERB and also from CR and CT which may account for the higher correlations when they are partialled out.

In order that more precise inferences about the influence of verbal intelligence on critical reading and critical thinking could be made, three multiple regression equations, and part correlations (Pugh, 1968) were calculated. Of the 53% of the total variance that can be explained from the multiple regression coefficient of .73 for CR considering the influences of CT and IQ VERB, 4% was unique to CT, 11% was unique to IQ VERB, and 38% was joint variance of CT and IQ VERB. Of the 59% of the total variance that can be explained from the multiple regression coefficient of .77 for CT considering the influence of CR and IQ VERB, 3% was unique to CR, 17% was unique to IQ VERB, and 39% was joint variance of CR and IQ VERB. Of the 66% of the total variance that can be explained from the multiple regression coefficient of .81 for IQ VERB considering the influence of CR and CT, 8% was unique to CR, 15% was unique to CT, and 43% was joint variance of CR and CT. It is apparent from these part correlations that verbal intelligence has a unique contribution to critical reading, and critical thinking respectively, larger than the unique contributions of critical thinking to critical reading or critical reading to critical thinking. It is also apparent that there is considerable common variance between verbal intelligence, critical reading, and critical thinking. Verbal ability is therefore a necessary and perhaps sufficient condition for critical reading–critical thinking.

The four second order partial correlations were all low and three were significant. These correlations are additional evidence of the influence of verbal ability, particularly vocabulary which when partialled out, without the non-verbal aspects of IQ total, produces a lower correlation indicating that critical reading – critical thinking relates strongly to verbal, vocabulary ability. Whether IQ total, READ VOCAB, or READ total was partialled out seems to make little difference. The correlations may also be seen as some evidence for the existence of some common critical reading–critical thinking variance.

Thus the second order partial correlations provide evidence of a profound relationship between verbal ability and critical reading–critical thinking, and also some possible evidence for the existence of critical reading–critical thinking. This evidence reinforces similar interpretations of the first order partials. However, while there is substantial common variance between verbal intelligence particularly vocabulary, critical reading, and critical thinking and this overlap may possibly be interpreted as evidence for the existence of the construct of critical reading–critical thinking, a more parsimonious interpretation is that verbal intelligence per se is a necessary and very possibly sufficient condition for the explanation of the construct of critical reading–critical thinking.

Table 2 indicates the canonical correlations between the following sets of subtests: critical reading vs. critical thinking subtests (1 vs. 2); critical reading subtests vs. reading subtests (1 vs. 3); critical reading subtests vs. reading, verbal and achievement subtests (1 vs. 4); critical thinking substests vs. reading subtests (2 vs. 3); critical thinking sub-

Table 2
Canonical Correlations

Set (s)	Set	Correlation
1	2	.84
1	3	.68
1	4	.83
2	3	.81
2	5	.89
1, 2	5	.93

Set 1
CR MAIN POINTS
CR SPEC FACTS
CR CAUSE EFFECT
CR INFERENCE
CR VOCAB

Set 2
CT PERT INF
CT VAL INF 1
CT VAL INF 2
CT REL GENS
CT RECOG ASSUMP
CT VAL INF 3
CT VAL INF 4
CT HYP VER 1
CT HYP VER 2

Set 3
READ VOCAB
READ COMP

Set 4
READ VOCAB
READ COMP
IQ VOCAB
IQ SENT COMP
IQ VERB CLASS
IQ VERB ANAL
FLA VERB
FLA ENG
FLA SOC SCI
FLA NAT SCI

Set 5
READ VOCAB
READ COMP
IQ VOCAB
IQ SENT COMP
IQ VERB CLASS
IQ VERB ANAL
FLA VERB
FLA ENG
FLA SOC SCI
FLA NAT SCI
FLA MATH

tests vs. reading, verbal, and achievement subtests (2 vs. 5); and critical reading and critical thinking subtests together vs. reading, verbal, and achievement subtests (1, 2 vs. 5).

The canonical correlations were all high, in excess of .67, indicating strong overlap between the different sets of subtests. The critical reading subtests correlated .84 with the critical thinking subtests, prima facie evidence of strong overlap between critical reading and critical thinking. The critical reading subtests correlated .83 with the reading and achievement subtests, the critical thinking subtests correlated .89 with a similar set of reading and achievement subtests, and the critical reading and critical thinking subtests correlated .93 with them. These four correlations indicate substantial overlap between critical reading and reading and language achievement, between critical thinking and reading and language achievement, and between critical reading and critical thinking. The canonical correlations provide evidence that critical reading and critical thinking share common variance and crucially that critical reading–critical thinking represents very considerable language ability.

CONCLUSIONS

Critical reading and critical thinking may exist as a thinking activity although verbal intelligence is probably an adequate explanatoin of the constructs.

Critical reading and critical thinking have a profound relationship with verbal ability particularly vocabulary.

Inter-item correlation, factor analysis and rotation are suggested to obtain information about the psychometric characteristics of the critical reading test, and the critical thinking test.

A final caveat, the validity of any correlational study depends upon the validity and reliability of the tests and subtests used.

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PSYCHOMETRIC ANALYSIS OF CRITICAL READING AND CRITICAL THINKING TEST SCORES–TWELFTH GRADE

This study is the third and last in a series of three statistical analyses of critical reading test score data of twelfth grade students. In the first analysis of the twelfth grade test scores Follman, Lowe, and Wiley (1971) found that critical reading overlaps substantially with reading, thinking, and language activities, particularly vocabulary, and also with critical thinking. In the second analysis of the twelfth grade data Johnson, Follman, Wiley, Lowe, and Miller (1971) found evidence which might be interpreted as support for the existence of the construct of critical reading-critical thinking. Another interpretation is that critical reading-critical thinking overlaps almost isomorphically with and possibly can be accounted for by verbal ability particularly vocabulary.

The objective of this study was to investigate the psychometric characteristics of the critical reading test and the critical thinking test so that precise inferences could be made about the definition of critical reading and its relationship with critical thinking. The tests analyzed were:

- Reading Comprehension Test (CR) total (Martin, 1939)
  - Main Points (MAIN PTS) subtest
  - Specific Facts (SPEC FACTS) subtest
  - Inference (INFERENCE) subtest
  - Vocabularly (VOCABULARY) subtest
- Test of Critical Thinking Form G (CT) total (ACE, 1951)
  - Pertinent Information (PERT INFO) subtest
  - Valid Inferences 1 (VAL INF 1) subtest

Valid Inferences 2 (VAL INF 2) subtest
Relevant Generalizations (REL GENS) subtest
Recognition of Assumptions (RECOG ASSUMP) subtest
Valid Inferences 3 (VAL INF 3) subtest
Valid Inferences 4 (VAL INF 4) subtest
Hypothesis Verification 1 (HYP VER 1) subtest
Hypothesis Verification 2 (HYP VER 2) subtest

PROCEDURE

The subjects (Ss), twelfth grade students from Robinson High School, Hillsborough County, Florida, were tested in the fall of 1969. The Ss were selected to represent typical twelfth grade Robinson High students. Mean IQ was 100.66.

Item difficulty and discrimination indices were determined.

Split-half odd even correlation and Kuder-Richardson 20 reliability estimates were determined for subtest and total test scores.

The basic dimensions of CR, CT, and CR and CT combined were investigated through inter-item phi coefficients, principal components factor analysis and rotation of factors with eigenvalues in excess of one. N was 57 for all analyses.

RESULTS

Mean item difficulty and discrimination indices were .42 for both CR and CT. A few items for each measure did not discriminate and should either be eliminated or refined.

Table 1 indicates subtest item groupings, medians, means, standard deviations, odd even split half and Kuder Richardson 20 reliability estimates for subtest scores and total test scores for CR and CT.

Table 1

Medians, Means, Standard Deviations, Odd Even and Kuder Richardson Reliabality Estimates

	Items	Mdn	$\overline{X}$	SD	OE	KR
CR						
MAIN PTS	1-5	3	3.47	1.45	.74	.56
SPEC FACTS	6-20	13	12.82	2.51	.71	.75
CAUSE EFFECT	21-25	3	3.39	1.41	.49	.53
INFERENCE	26-35	6	6.21	2.17	.63	.57
VOCABULARY	36-50	11	11.44	2.93	.76	.76
TOTAL	1-50	38	37.30	8.90	.88	.92
CT						
PERT INFO	1-6	4	4.42	1.77	.74	.66
VAL INF 1	7-10	1	1.32	1.04	.43	.20
VAL INF 2	11-16	1	2.75	1.63	.66	.53
REL GENS	17-21	1	2.53	1.32	.30	.34
RECOG ASSUMP	22-31	5	6.18	1.81	.43	.40
VAL INF 3	32-34	1	1.23	1.13	.50	.46
VAL INF 4	35-37	1	1.04	.98	.52	.36
HYP VER 1	38-46	2	4.05	2.21	.40	.63
HYP VER 2	47-52	1	2.53	2.10	.87	.69
TOTAL	1-52	27	27.86	8.64	.86	.87

Total test score reliability estimates were high for both CR and CT, and subtest score reliability estimates with one exception were above .29 with most considerably higher.

Inter-item phi coefficients for CR ranged from .65 to —.50 with many non-significant. Correlations of .26 and .34 were significant at the .05 and .01 levels respectively. No correlation matrices or factor loading tables are presented because of space limitations, however, these tables are available upon request.

Factor analysis of the 50 x 50 inter-item phi matrix for CR indicated several group factors. Considering loadings of .30 or greater the first factor consisted of 22 items and accounted for 20% of the total test variance. Subsequent factors consisted of successively fewer items and accounted for successively smaller amounts of total test variance. Eigenvalues were successively 9.9, 5.1, 3.7, etc. Apart from the first factor, which had loadings from items of all five subtests, items tended to load in sets partly consistent with the a priori subtest item groupings in that there were several groups of items from their respective subtest groupings. They were also inconsistent in that these sets of items often represented two or more subtests and loaded on the same respective factors.

Rotation demonstrated remarkable consistency of both items and item strengths for the largest group factor. Twenty items loaded on both factors across rotation. These items apparently measure the same underlying construct. However, the items generally did not cluster in a priori subtest groupings. Other factors generally were not consistent across rotation nor consistent with the a priori subtest item groupings although some items grouped together consistent with the a priori groupings. Point biserial correlations between each item and total score ranged from .102 to .696 with a median of .467. Most of the items with high correlations were the items that loaded on the largest group factor, additional evidence that many CR items measure the same underlying construct.

Inter-item phi coefficients for CT were generally lower than those of CR and most were between ±.35 with many lower non-significant ones.

Factor analysis of the unrotated and rotated factor loadings of the 52 x 52 inter-item phi matrix for CT indicated mostly factor loadings of moderate or low strengths. Eigenvalues for the respective factors were successively 5.1, 3.8, 3.0, etc. Factor analysis indicated more small group factors consisting of both fewer items and particularly weaker loadings than the CR factors.

The smaller loadings by fewer items per factor were accentuated by the rotation as it produced high loading individual items many of which appeared with two or three other relatively weak item loadings. Apparently most CT items represent different underlying variabiles which generally correlate low, but which correlate higher with the overall CT score as reflected by the high total test score reliability. Point bi-serials ranged from —.109 to .612 with a median of .379. These correlations were generally considerably lower than those for CR, and are also additional evidence that the CT items measure a number of different variables. There were relatively few item groupings consistent with the a priori subtest categorizations.

In order to determine the relationship between critical reading and critical thinking, an analysis of the 102 x 102 item matrix of both tests was conducted. The CR items generally intercorrelated low or moderately as did the CT items but the CR and CT items generally correlated lower than the items within either CR or CT only.

Factor analysis indicated interesting variance structure. Small group factors appeared accounting respectively for 12%, 7%, and successively smaller amounts of variance. The first group factor, accounting for 12% of the variance consisted of low or moderately sized loadings from 10 CT items and low, moderate, and high loadings from 27 CR items. Subsequent group factors had similar but fewer item compositions from both tests. The lower strengths of the CT items vis a vis the CR items is noteworthy, apparently reflecting somewhat the idiosyncratic nature of the CT items as well as the greater common variance of the CR items.

Rotation in the 102 x 102 analysis dramatically revealed the extent of the split between CR and CT variance. Rotation produced a number of smaller group factors which were with infrequent exceptions specific to CR items or CT items. This helps account for the fact that no general factor appeared in terms of amount of variance accounted for. This apparently means that the CR items represent CR test specific variance and that the CT items also represent CT test specific variance which although overlapping on the total test score level ($r = .62$) and somewhat on the subtest level (low and moderate CR and CT subtest correlations, Follman, Lowe, and Wiley (1971), apparently overlaps very little on the individual item level.

Rotation in the 102 x 102 analysis indicated substantially the same factor structure for CR and CT as was indicated in the 50 x 50 CR analysis and 52 x 52 CT analysis independently. The fact that the relatively homogeneous CR structure and the heterogeneous CT structure held up in the combined analysis is additional evidence of the disparate nature of CR and CT variance.

It is therefore concluded that critical reading and critical thinking do not strongly relate. This conclusion is veridical in so far as CR represents critical reading and CT represents critical thinking.

In order to infer the definition of critical reading, items loading .30 or above on the rotated large group factor in the 50 x 50 CR analysis were examined for apparent commonality. The large group factor was composed essentially of items 1, 4, 8, 9, 12, 13, 14, 16, 17, 20, 21, 28, 29, 32, 36, 37, 39, 40, 41, 44. These items represented all five CR subtests approximately proportionally. The location of items in different subtest categorizations implies that the different subtests measure different abilities and correspondingly that their respective items do also. It is suggested that the subtests while purportedly representing different skills, actually do not. Additional evidence for this interpretation is the moderate and high correlations between the CR subtests (Martin, 1939).

In any case it appears that the large CR group factor represents judgments about statements of similar content in true false and multiple choice objective test form. In the true false format subjects related statements for accuracy to a passage and in the multiple choice format subjects related words or phrases for snyonymic accuracy to statements. It is therefore concluded that the variance measured by CR represents underlying thinking activity of judging verbal material in objective test form for accuracy of meaning synonymically to other verbal statement or passage material.

In order to infer the definition of critical thinking, items loading .30 or above in the 52 x 52 analysis were examined for commonality. CT consists of a heterogeneous collection of items representing a considerable number of different thinking activities rather than one general thinking activity or a few thinking activities. Since nearly all the rotated factors were small group factors each of few items from at least two subtests it is difficult to infer accurately the definition of the thinking activities they purportedly represent. Twenty-one items loaded on the largest CT group factor indicating some common variance but rotation split off 13 of these items into other factors, apparently because in addition to the common variance they individually had enough additional idiosyncratic variance to become separate from the common group factor. Critical thinking as inferred from the different separate factors described above is seen as a composite of skills, particularly judgments of how statements relate to conclusions, interpretation of verbal statements, recognition of assumption, hypothesis verification.

As discussed above critical reading and critical thinking are seen as having small overlap in terms of measuring the same underlying variable. The relatively small common variance may in fact reflect other commonalities such as the medium of language used by both, or similarity in content across tests.

CONCLUSIONS

Both CR and CT are psychometrically sound instruments. CR represents a relatively homogeneous underlying variable. CT represents a number of different underlying variables. Critical reading was inferred to be thinking activity involving judging verbal material in true false and multiple choice form for accuracy of synonymic meaning to other verbal statement or passage material. Critical thinking was inferred to be less clearly defined as a composite of thinking skills including judgments of how statements relate to conclusions, interpretation of verbal statements, recognition of assumptions. Critical reading and critical thinking as represented by CR and CT respectively, overlap only moderately.

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THE RIGHT TO READ: A PROGRESS REPORT

Last September in a speech before the National Association of State Boards of Education the United States Commissioner of Education challenged all of us when he announced "The Right to Read–Target for the Seventies." In that call to the Nation, Dr. Allen proclaimed that "We should immediately set for ourselves the goal of assuring that by the end of the 1970's the right to read shall be a reality for all–that no one shall be leaving our schools without the skill and the desire necessary to read to the full limits of his capability [1969, p.3]." In making this announcement, the Commissioner indicated that the first year would be a year of planning. This report is a summary of the activities of that year.

Recognizing that to achieve a goal of such magnitude would require involvement far beyond the forces of education, in December 1969 the Commissioner of Education appointed an Ad Hoc Task Force to develop a plan providing for the involvement of both the public and the private sectors of our society in this national campaign to eliminate illiteracy. The Task Force report resulted in the announcement by President Nixon on July 31, 1970, of the formation of the National Reading Council. Composed of a cross-section of society, the Council will provide the partnership structure through which the skills and resources of the communications media, business, labor and the general public will be mobilized and will join with the educational community and the government at all levels in a concerted attack on this problem. The operating arm of the Council is the

National Reading Center whose activities will include coordinating the efforts of contributing public and private organizations, organizing the training of citizen volunteers, developing public support and measuring the progress towards the goal.

A Right to Read Office was established in the Office of Education and is responsible for coordinating and mustering support for the Right to Read from existing educational programs and funds administered by the U.S. Office of Education.

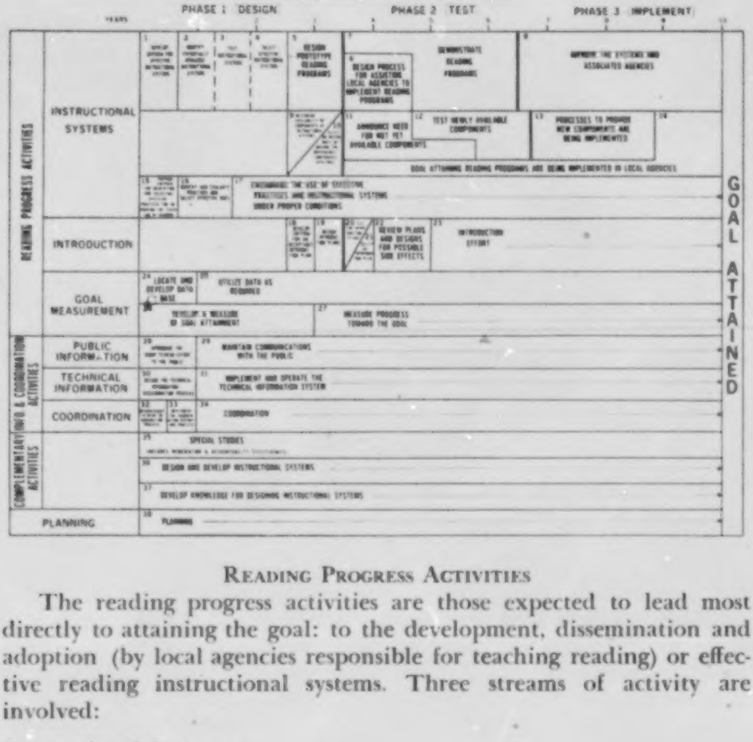
This, then, is the National Right to Read Effort: a coordinated endeavor undertaken by all segments of society, public and private, professional and non-professional, to insure that in the next decade Americans shall not be denied a full and productive life because of an inability to read effectively. This Effort is not primarily a Federal effort, a single reading program nor a single reading method which is to be endorsed for the teaching of all. It does not remove authority or responsibility for overcoming reading handicaps from the State and local governments and the citizens of our communities where the responsibility for education properly rests in this country. The Right to Read Effort is a campaign to persuade the public that there is a national reading problem, to determine what changes are required to accomplish the goal, to persuade those who need to change to do so, to identify existing resources, public and private, which can be brought to bear on the problem, and to make additional resources available.

Other major planning efforts were undertaken at both the State and the Federal level. At the request of the Commissioner of Education, many of the State Departments of Education have embarked upon their own planning activities and have developed or are developing plans for State action leading towards the attainment of the Right to Read goal in their State. And at the Federal level, an intensive planning session was held to determine what should be done to realize the Right to Read goal. Though the session did not result in a complete, detailed plan for the national effort, it did result in the development of a preliminary plan which describes and sequences the activities needed to attain the Right to Read goal. This plan I should like to discuss with you in some detail.

In 1967, Louis Carrese and Carl Baker of the National Institutes of Health developed a method for the planning and programming of research efforts. Called the Convergence Technique, it originally was formulated for application to biomedical research and development problems. Subsequently it was applied to reading research and development by William J. Gephart of Phi Delta Kappa in formulating a draft plan for the Targeted Research and Development Program on Reading (1970). Using the Convergence Technique, a chart for the ten-year National Right to Read Effort was developed at the planning session which provides for three major areas of activities in addition to continuous planning activities. These areas are: Reading Progress Activities, Information and Coordination Activities, and Complementary Activities. Activities in each of these three areas are divided into "streams" – coordinated operational procedures concentrating on specific aspects of the major activity. The relationship of these activity areas is presented diagrammatically on the National Right to Read Effort Activity Chart (Figure 1). The activities are shown in approximate time relationship with the overall program requiring ten years. The numbers on the chart do not represent sequences but are for ease of cross-reference.

FIGURE 1

NATIONAL RIGHT-TO-READ EFFORT


PHASE 1 DESIGN
PHASE 2 TEST
PHASE 3 IMPLEMENT
YEARS
READING PROGRESS ACTIVITIES
INSTRUCTIONAL SYSTEMS
INTRODUCTION
GOAL MEASUREMENT
INFO & COORDINATION ACTIVITIES
PUBLIC INFORMATION
TECHNICAL INFORMATION
COORDINATION
COMPLEMENTARY ACTIVITIES
PLANNING
DESIGN PROTOTYPE READING PROGRAMS
DESIGN PROCESS FOR ASSISTING LOCAL AGENCIES TO IMPLEMENT READING PROGRAMS
DEMONSTRATE READING PROGRAMS
ANNOUNCE NEED FOR NOT YET AVAILABLE COMPONENTS
TEST NEWLY AVAILABLE COMPONENTS
PROCESSES TO PROMOTE NEW COMPONENTS ARE BEING IMPLEMENTED
GOAL ATTAINING READING PROGRAMS ARE BEING IMPLEMENTED IN LOCAL AGENCIES
ENCOURAGE THE USE OF EFFECTIVE PRACTICES AND INSTRUCTIONAL SYSTEMS UNDER PROPER CONDITIONS
REVIEW PLANS AND DESIGNS FOR POSSIBLE SIDE EFFECTS
INTRODUCTION EFFORT
LOCATE AND DEVELOP DATA BASE
UTILIZE DATA AS REQUIRED
DEVELOP & MEASURE OF GOAL ATTAINMENT
MEASURE PROGRESS TOWARD THE GOAL
MAINTAIN COMMUNICATIONS WITH THE PUBLIC
IMPLEMENT AND OPERATE THE TECHNICAL INFORMATION SYSTEM
COORDINATION
SPECIAL STUDIES
DESIGN AND DEVELOP INSTRUCTIONAL SYSTEMS
DEVELOP KNOWLEDGE FOR DESIGNING INSTRUCTIONAL SYSTEMS
PLANNING
GOAL ATTAINED

Reading Progress Activities

The reading progress activities are those expected to lead most directly to attaining the goal: to the development, dissemination and adoption (by local agencies responsible for teaching reading) or effective reading instructional systems. Three streams of activity are involved:

Instructional Systems

These are the activities which coordinate the design, test and pilot implementation of effective reading programs for local agencies. Most of these activities will take place at State and local levels, in private agencies and universities. Reading programs include effective instructional systems and practices and the procedures for using them. Local agencies include public and private schools, libraries, industry, community centers and the family. Some of these activities encourage the development of the needed components and the training of instructors.

Introduction Effort

These are the activities which design, test and implement plans for publicizing and encouraging the use of effective systems and practices and for assisting in their adoption and operation by local agencies.

Goal Measurement

To insure progress, activities are included to measure the extent to which the goal is being attained. This requires first a precise definition of a procedure for measuring the national level of reading skill and desire. The procedure must be a criterion-referenced instrument, based on real-world, reading-dependent behavioral requirements. The resulting procedure would then be administered periodically to measure how close the nation has come to attaining the Right to Read goal.

INFORMATION AND COORDINATION ACTIVITIES

The information and coordination activities support the Right to Read Effort by informing the public and educators of activities and progress, by developing channels by which citizens and institutions can communicate their opinions and ideas to local, State and Federal agencies, and by facilitating the coordination and direction of those participating in the Effort. In each of these activities, provision must be made for participants to communicate with one another as well as with the national coordinators. Like the Reading Progress area, this area has three streams of activities:

Public Information

These activities inform the public of the reading problem and progress toward the goal. Some of these activities include the establishment of channels by which the public can communicate with the coordinators of the Effort, with educational institutions and with others involved in teaching reading. As solutions become available, parents will be encouraged to observe their children's reading progress and, if it is not adequate, to take appropriate action. Regular media, volunteers, existing educational communication channels and special communications networks will all be used in this communication process.

Technical Information

These activities result in the dissemination of technical information and data about effective instructional systems and practices for teaching reading. The dissemination required will utilize both existing systems (e.g. ERIC) and such new systems as may be devised.

Coordination

These are the activities which build an information system to insure that the National Right to Read Effort is coordinated. This system will permit those participating in the Effort to report progress, difficulties, findings and resource utilization to the coordinators and to other participants. It will provide channels by which the national coordinators can communicate sub-goals, activity plans, resource allocations and progress information to all participants.

COMPLEMENTARY ACTIVITIES

Given our incomplete knowledge of reading phenomena, there is a possibility that the Reading Progress Activities will not completely meet the Right to Read goal. Complementary activities are proposed to help increase the probability of meeting the goal and to reduce the cost. The National Right to Read Effort will support the Targeted Research and Development Program on Reading which will lead to a deeper understanding of reading and of the way in which children learn to read. This in turn will facilitate the design and development of reading instructional systems which do meet the goal, which are more efficient and, therefore, use less of the nation's resources.

Other special studies and instructional system development efforts will be encouraged. These will help pinpoint ways of improving the cost-effectiveness of the Right to Read Effort and of the teaching of reading.

PLANNING

In order to insure that the National Right to Read Effort is coordinated, is effective and leads to goal attainment, it is necessary to review the plans at least yearly—for planning for any program is a continuous process.

PHASING

As indicated earlier, the overall Effort requires ten years. In the Reading Progress area, three progressive phases leading to goal attainment are perceived. These phases are separated by double vertical lines in Figure 1.

Phase 1 — Objective and Criteria

The objective of Phase 1 is to produce all of the technical information required to attain the goal. The criteria for the completion of this phase are the following:

1. A complete set of instructional systems have been specified, such that they can be put together into reading programs which will satisfy the needs of the many diverse local agencies.

2. The procedures for designing a reading program (consisting of the selected instructional systems and effective practices) have been specified.
3. At least one plan is available for introducing and implementing effective reading programs.
4. The components of the instructional system which are not yet available have been identified and the need for them estimated.
5. A procedure has been proposed and tested which will measure progress toward the goal.
6. All of the data needed to continue the Reading Progress activities are available or can be obtained when needed.

By this time, other activities should have insured that all of the communication procedures have been established for allowing free communication about technical and non-technical matters relative to the Right to Read Effort between all segments involved.

Phase 2 – Objective and Criteria

The objective of Phase 2 is to test the designs produced in Phase 1 to insure that they work and have no outward side effects. The criteria for completion of Phase 2 are:

1. The approach to the design of reading programs and the use of effective instructional systems has been successfully demonstrated.
2. Complete information is available which will describe how a local agency can design, implement and operate its reading program to attain the goal. This information should be based on actual tests and demonstrations.
3. Complete information is available to field personnel which instructs them in how to assist local agencies in implementing a reading program and in obtaining the revenues and other resources required for it.
4. Measurements of progress toward the goal indicate that there is still a problem.

Other activities should insure that there is continuing public and institutional support for the National Right to Read Effort.

Phase 3 – Objective and Criterion

The objective of Phase 3 is the adoption and implementation of a goal-attaining reading program by every local agency not already meeting the goal or not attaining intermediate behavioral objectives. The criterion for completion of Phase 3 is the attainment of the National Right to Read Effort goal as indicated by the measurement procedure to be developed early in the Effort.

Though the preliminary plan was originally developed as a basic document to be presented to the National Reading Council for review and revision prior to implementation, the delay in the appointment of the Council made it necessary for Fiscal Year 1971 activities to get under way before the first meeting of the Council. Consequently, this preliminary plan has served as the planning document for the Office of Education's Right to Read activities in the present Fiscal Year including the expenditure or commitment of more than $10 million of discretionary funds. (It is anticipated that a master plan for the total National Right to Read Effort, incorporating elements of the preliminary plan as well as such revisions and additions as may be offered by the National Reading Council, will be submitted by the Commissioner of Education to the Secretary of Health, Education and Welfare for approval within the next few months.)

Before describing some of the first year activities, let us consider briefly the Targeted Research and Development Program on Reading and its relationship to the National Right to Read Effort. Both endeavors call for a goal-measurement instrument which provides for successful performance of those reading tasks deemed to be an integral part of adult life. Initiated more than a year prior to the announcement of the Right to Read, the Targeted Research and Development Program is concerned with attaining the goal through theoretical understanding of the reading process, language development and the learning to read process. It emphasizes the orderly progression from scientific success through development and test to implementation. The Targeted Research and Development Program, recognizing the difficulties of behavioral science, does not set a time goal.

The National Right to Read Effort, on the other hand, uses available and accumulating knowledge to reach the goal by 1980. The intent of the National Right to Read Effort is that every local agency responsible for teaching reading will have built over the next nine years its own reading program—one which will have the highest probability of producing goal-level reading skills and desire in its students. To assist a local agency in building a program for its varied populations, the National Right to Read Effort will help the local agency implement instructional systems and practices which have been demonstrated to have been effective in teaching specific reading behaviors.

Let us turn now to the first year activities on the National Right to Read chart (Figure 1). The development of criteria for defining effective instructional systems and practices (activities #1 and #15 respectively) is under way under the aegis of the Office of Education's National Center for Education Research and Development. Basic to the success of a long-term effort such as the Right to Read is the development of a solid data base (activity #24). The Targeted Research and Development Program has assumed the major responsibility for this activity and is supporting research and development projects to: collect and analyze existing data which will profile reading achievement by different population groupings; determine and evaluate the state of scientific knowledge about reading and learning to read; and, survey and catalog available components (texts, equipment, teaching skills) involved in engineering a reading instructional system. Finally, the Targeted Research and Development Program has initiated work on the definition and development of standards for adult reading competence through pinpointing the basic printed materials with which people presently must work—this represents the first step in the development of a broad-based measure of progress toward attainment of the Right to Read goal (activity #26).

Though public information will normally be the function of the National Reading Council, the following activities has been funded under Office of Education contracts to introduce the Right to Read Effort to the public (activity #28): the development and distribution of five 60-second and five 30-second television and radio spot commercials on the Right to Read; the production of one half-hour, color/sound motion picture on reading deficiency in America; in the Spring of 1971, a traveling seminar will visit each of the Department of Health, Education and Welfare's ten regions and will explore with citizens (largely from outside the educational community) various aspects of the reading problem and possible solutions on the local level; and, the establishment of a Speakers' Bureau in support of the National Right to Read Effort.

The Office of Education's National Center for Educational Communication is deeply involved both in the actual dissemination of technical information and in the development of a communications and dissemination process (activity #30) which will accelerate the spread and installation of validated practices and research-based products.

The staff of the National Reading Center and the Right to Read Office in the U.S. Office of Education are currently working on the development of a coordination system for the National Effort (activity #32). A priority of the Bureau of Elementary and Secondary Education is the study and evaluation of performance contracting (activity #35). And finally, the Targeted Research and Development Program on Reading and the on-going reading projects in the Regional Laboratories and the Research and Development Centers are examples of activities included within blocks #36 and #37. A sampling of these programs include: the Wisconsin Research and Development Center's elementary school program to expedite individually guided instruction in reading skill development; the Pittsburgh Research and Development Center's individually prescribed early reading program and the installation of this program by Research for Better School (the Philadelphia-based Regional Laboratory); and the Southwest Regional

Laboratory's work in the development of a pre-school and elementary reading and language development instructional system.

Many ,many other activities in support of the National Right to Read Effort have been undertaken in the year since the Right to Read was proclaimed as education's moonshot for this decade. Let us not be unmindful, however, that soon we will be at the point of one down and nine to go for the 1980 target date–and the big steps are ahead. The members of the National Reading Conference have much to contribute to the accomplishment of these steps. I trust that the National Right to Read Effort will continue to have your active support.

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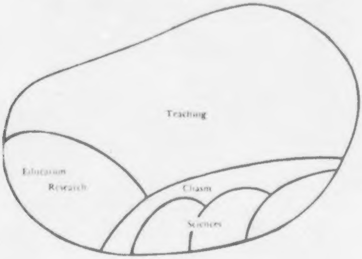
AN ENGINEER IN READING LAND

About five years ago, somewhat by accident, I shifted my principal concern from engineering—particularly the engineering of complex information systems—to the world of education. About two years ago I was introduced to the vast continent in that world called Reading. I tried earnestly, with my engineering background, to make sense out of the wonders of the continent of Reading. I think I am beginning to see some of the features of this continent; some of the hills and chasms, of which there appear to be many. This is the story of the humble engineer in reading land.

My map of the reading continent looks like this (Figure 1): There is one country called Educational Research. In this country people run around in little circles trying to find a speck of gold in fields of

Fig. 1: Continent of Reading



dust. They make little studies as to whether text book "A" is better than text book "B", or whether you should present the word CAT before the word DOG in teaching children to read. This land appears to be very dusty and the specks of gold are few and far between.

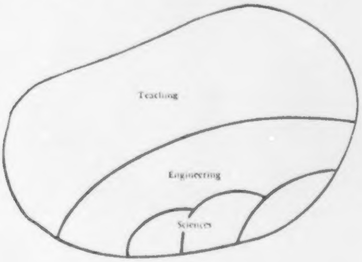
There are several small countries–the Basic Science Nations–which contain people doing research that is not immediately related to reading. These countries are called Psychology, Sociology and Artificial Intelligence. They are separated from the rest of the reading continent by a deep chasm crossed only once in a while by a lonely traveller. The people in these small countries are trying to understand the geology of the land. They would like to be able to predict where gold might be found, although they are less interested in the gold itself, than in how to predict. They are doing proper science, and they seem to largely communicate within their own country.

Finally, there is a country covering the bulk of the continent called Teaching, a large confused mass, covered with fog most of the time. Once in a while there is a traveller between the countries of the Educational Research and Teaching. This appears to occur whenever someone in Teaching needs to rationalize a prejudgment as to how to improve reading.

The chasm which separates Teaching and Educational Research from the Sciences is very deep indeed.

My engineering orientation would lead me to expect to find another country (Figure 2), one that is adjacent on one hand to the Sciences, and on the other to the large country of Teaching. In such a country–we might call Engineering–I would expect to find citizens whose main job it is to travel from one border to the other. They carry knowledge of where the gold might be found, from the small Science countries, to those who are actively looking for the gold in Teaching. This country of Engineering would be populated by people whose background and orientation propels them to understand and know the results of science (although not necessarily do it). On the other hand, they are also motivated to help the individual citizens of the country of Teach-

Fig. 2: Continent of Reading



ing to find gold, by use of not only the scientific findings, but whatever experience and art they have acquired in performing this job previously.

The main business in the country of engineering is to bridge the existing chasm; to utilize scientific findings and previous experience to improve ongoing educational programs and to create new, and improved programs. Engineering is the function which makes innovation—about which there is so much talk—possible.

About two years ago the School District of Philadelphia undertook to install and design a complete community school. The project started because a new school, the Hartranft School, was to be built. The school authorities felt that this would be a good opportunity to develop the idea that education would proceed more smoothly if the school became a true community center. It was hoped that the school would serve not only for regular and after school activities but for adult education, as a local community health center, as a recreation center and a general community meeting place. The physical facilities were to be designed to facilitate this approach.

In order to implement this idea it is obvious that a number of groups had to be involved: community groups, local churches, and other active local organizations, as well as the city recreation and health departments and, possibly, State and Federal agencies such as the employment service.

The associate superintendent most directly involved with this project was faced with the question of how to deal with these various groups; who should he talk to first, which groups should he talk to separately and which together, should he talk to leaders to the entire membership, what kind of public relations were required, and so on. The associate superintendent turned to some people at local universities—people from the Science country. He called in a sociologist and a social psychologist. After exploring the problem for several hours, these scientists said, "This is a very interesting problem. We'll come back with a proposal for a three year program. We will study this problem and develop a real understanding of the sociology of this community." They could not cross the chasm; they were still doing science.

You can imagine what happened. The superintendent was involved making decisions tomorrow or the day after, and needed immediately applicable advice. And the scientists were going to perform a three year scientific exploration! The associate superintendent thought he was talking to people who would play the role of engineer (although he was not consciously aware of that desire) and the scientists were playing their true role of observing the phenomena as a basis for study, the result of which would be scientific know-how, not decisions.

In another case, in a western state, a school principal heard about

Advanced Placement (providing good students with college level work in high school, so that they can start college at an advanced level. In May he said to his staff, by September our school will have an Advanced Placement program! There was no thought of engineering a system for providing this kind of training. As a matter of fact, it takes several years to develop an Advanced Placement program. Not only does one have to hire and train special staff, but certain groups of students have to be started into the proper track, so that by the time they are juniors and seniors, they have the background necessary for the advanced courses. Engineering takes time.

A major eastern, urban school district recently undertook a study of whether to decentralize and if so how. (It was proceeding carefully, because it did not want to get into the same sort of difficulties which arose in New York City). A commission was established with 58 people and a $30,000 budget. Their job was to "engineer" the new decentralized organization with its community interaction and administrative procedures.

The head of the staff for this commission was a former city planner. This man had directed the expenditure of many millions of dollars for the engineering of facilities. For example, *he* told me that a typical high school required about $600,000 for engineering. I asked him then, how is it possible that a physical facility, for which we have a great deal of design and building experience, and which depends on well established physical science, requires $600,000 and yet the very complex system problem of redesigning an entire school district with all of its human and social interactions is to be done for only $30,000! Even he, who had the engineering concept, who had used engineering himself, did not recognize the utter inconsistency in these two levels of funding.

At least one case in which the lack of engineering is clear has been carefully documented by Neal Gross (1968) and his associates then at Harvard University. The Harvard group were purely observers of an effort to implement a relatively basic change in a school district. However, the time schedule is not made completely clear in Gross's report. Apparently, the ideas for the change were developed during the summer of 1966, the innovation was initiated in the late fall of 1966 (while school was in progress, of course), was given additional impetus in January of 1967, and was evaluated by Gross extensively in May of 1967. The time scale alone gives us a clue that no attention was paid to the engineering of this change. Engineering takes time and it would have been almost impossible to have done it between June and September or October of one year.

The basic nature of the change was to convert elementary school classes from classical highly structured programs to relatively unstructured situations in which the individual child would be able to explore more fully his own paths of learning and his own capabilities. The innovation was to be implemented only in those rooms where the teacher was agreeable. Gross wished to examine this study because he wishes to refute the notion that innovation of this type failed because of initial resistance to change. The history of the school was such that it was clear that the staff and the administration were most favorably inclined toward innovations and were willing to try them out. Many of the teachers were new and were not tied to any traditions of the school and/or the profession.

A study of Gross' report shows that this particular innovation was bogged down by the most trivial things: the materials required for the new classroom situation were not available. (Even *simple* planning would have obviated this problem.) The staff was not trained, not even oriented, in the way in which the children might behave in the new classroom situation. Therefore, they confused free expression with undisciplined behavior. As a result of this and other problems, the staff became quickly disenchanted. The administration, in the absence of planning for such contingencies, did nothing about it except to call in *ad hoc* consultants, which made the matter worse. By May the innovation had essentially failed, and the school returned to classical methods. The absence of engineering had caused another fiasco.

Although the country of engineering does not exist in reading there are a few towns who try to perform the engineering function. The title IV or regional labs translate scientific results into practical curriculum and learning systems. Some of them have taken on the next job of seeing that these systems are properly implemented in Teaching.

Given, admittedly, a bias as a result of my engineering background, I would like to see the Educational Research country (of the few gold specks) gradually wither away, to be replaced by the country of Engineering. To do this we must give specific attention to who will be the citizens; who will perform the engineering function and how they will be trained. I recommend, for example, the creation of new schools (or curriculums within schools of education), devoted to teaching people how to implement and design innovations. These people would not necessarily learn a lot of sociological irrelevancies about diffusion and dissemination, they would learn some hard facts about engineering, such as: engineering takes time and money; a key result in engineering is the preparation of detailed specifications for the equipment, materials and processes to be implemented; in the social sector, engineering requires the involvement of the future teachers through their participation in the implementation process, and awareness of the design process; engineering involves the use of the best tools possible for predicting the consequences of various designs (and not the advocacy system); promising alternatives must be carefully considered in terms of performance and implementation feasibility (not just one favorite approach).

I have had occasion to put these notions into practice in helping the Office of Education develop the Targeted Research and the Development Program for Reading and in developing a plan for the National Right to Read Effort. I hope you will have occasion to read about these plans. As you read through these and other proposals think about whether the engineering function has been recognized and properly scheduled.

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THE RESEARCH AND DEVELOPMENT PROGRAM IN READING

Let us first consider the primary goal of the Reading and Development Program in reading. As you have heard, this goal is to produce "functional reading competence on the part of all persons reading age ten", i.e. in all reading skills necessary for an individual for a reading performance comparable to that of ten year olds. What are the implications of this statement of the goal of the Reading and Development Program?

PREDICTIVE VALUE OF FOURTH GRADE READING

That a fourth grade reading performance will be predictive of success in adult reading tasks of all types. Note—We are not accusing these planners at this moment of saying that fourth grade reading skills are all that any adult need acquire for adult reading tasks, but simply drawing the obvious implication that they believe that if a child reaches functional competence at the fourth grade level, he will eventually be successful with adult reading tasks.

The choice of fourth grade as a lower limit of reading ability is not an unreasonable one, for throughout the world it is generally recognized that this is the boundary line between functional literacy and crippling illiteracy. In the sense that such a level of performance would eliminate illiteracy and contribute to vocational adequacy, this goal is realistic in proposing a minimum level of reading ability.

In the sense of dividing between illiterates and functional literates, the fourth grade ability level is certainly acceptable. On the other hand, I know of no longitudinal studies which indicate that there is a high correlation between reading ability at the age of ten and ultimate scholastic and academic success. In contradiction, we see the British dropping their eleven-year-old examinations because of their lack of predictive accuracy for later scholastic or vocational performance.

SUFFICIENCY OF FOURTH GRADE READING

That the acquisition of fourth grade reading skills is sufficient for most adult reading tasks is a second implication which may be derived from the Reading and Development Program's goal statement. Whether this implication is justified, depends upon one's interpretation of the real, but unstated, goals of the Reading and Development Program. Is this a program really intended to eradicate illiteracy in America by finding ways and means of producing minimal reading competence for all the population? Or, is this a program that intends to effect ordinary developmental reading instruction so that it will produce, at least, a minimum competence for all the population?

It is quite clear from the descriptions of the proposed program that its real goal is not the eradication of present illiteracy but the improvement of instructional procedures and practices to the point that they will produce functional literacy for all pupils. Presumably illiteracy would thus disappear in the population, and this is undoubtedly an implied goal to be accomplished in the next twenty years.

But what concerns us is the inherent implication that, in the minds of the directors and planners of this program, fourth grade reading ability is adequate training for most adult reading tasks. I am certain the Reading and Development planners will immediately disclaim this implication, just as I am certain that most of the members of this audience would violently object to such a standard of reading performance as highly predictive of or sufficient for adult reading success.

But despite these disclaimers and objections the implications are still there in the statement of the goal. If fourth grade reading ability is not really sufficient for future reading tasks, then how can the standard be justified? If many pupils will need more than fourth grade reading skills, why are these individual differences ignored?

As a matter of fact, several early studies of adult reading raise serious doubts about the adequacy of fourth grade reading ability for adult reading tasks. Gray and Leary (1935), Ojemann (1934), and Dale and Tyler (1934) all demonstrated that adults with less than fifth grade schooling tended to regress in reading ability, while those with more than five years tended to maintain or improve in reading skills. How realistic then is a goal of producing fourth grade reading ability?

Another pertinent observation in these three studies was a low relationship between the last school grade attended and reading ability as an adult. How, then, can we consider fourth grade reading ability adequate for adult reading tasks?

Is the statement of the goal of the Reading and Development Program really consonant with the description of the research activities proposed? I think you will agree that there is a conflict between the goal and the proposed research. The goal is in truth the production of functional literacy for all the population. The research, however, will concern itself with inventing a new and different way of teaching developmental reading that will function *only up to the fourth grade.* What model or definition of the reading progress, what description of developmental reading are you familiar with—that stops short at the fourth grade? What sort of a primary reading program could conceivably be invented that would ignore its foundational relationship to the new, technical reading skills that must be learned in dealing with materials beyond fourth grade level? Are we dealing here with planners whose definition of reading is that it is simply a decoding process, implying that training in critical reading, skimming, scanning, and the dfferent skills demanded by various content fields need not be taught?

INSTRUCTIONAL PROGRAM UNIVERSALITY

The goal implies that the reading instruction program will be effective for all the school population. The breadth of this goal statement offers other implications or should I call them assumptions? There is, first, the assumption, derived possibly from the use of the convergence technique in medical studies, that a method of instruction can be designed which will cure all our reading ills. In other words, we are asked to believe that by carefully converging all our research toward that one goal—a panacea for any causes of reading retardation will be found.

I greatly fear that, if the intensive research of the literature on reading methodology is carefully done, as the plan suggests, these researchers may question this possibility of an omnipotent method being discovered or created. What conceivable program of instruction could control the major variables which condition pupil success in reading, such as the professional preparation and enthusiasm of the teacher; the handicaps imposed by bilingualism, language deprivation or substandard dialect; the influence of the cognitive style of the learner and of the learning modality employed; or the significance of visual or auditory or cross-modality deficits? What method of reading instruction will be invented that will control the variables of socio-economic status, peer status, self-concept, teaching style and classroom climate, etc.? Even a cursory reading of the primary reading studies sponsored by the Office of Education during the period from 1964-69 yields the contradictory evidence that these variables—not method or materials—are the major determiners in learning to read.

There are certainly other questions that may be raised regarding this plan. One concern is expressed by Jacobs and Felix in this quotation:

> "The thought that billion-dollar expenditures for education may be contingent in part upon the rise of tested pupil achievement makes one wish more confidence could be placed in such measures both in terms of their proper use and interpretation and of their relevance in measuring important educational outcomes." (1968, p.19)

TARGETED RESEARCH AND DEVELOPMENT PROGRAM

Douglas G. Ellson (1970) of Indiana University has further criticized the Targeted Research and Development Program as it was presented in a descriptive paper by William J. Gephart in a recent issue of the Reading Research Quarterly. To summarize them briefly, some of Ellson's criticisms were:

> It is not really an example of the convergence technique, as it claims to be, for it goes beyond the planning of the research function which is the intended goal of the convergence technique. The Targeted Research and Development Program includes not only research but also the design and testing of an instructional system, the procedures for delivery of this system, and a strategy for using this system to promote educational change.
>
> Yet, despite its additional components of development and dissemination, the Targeted Research and Development Program plan makes little or no mention of the resources needed to implement the entire plan. Ellson considers this a crucial omission in Gephart's overview article for, he points out, this plan may grow to such dimensions that it might monopolize most of the money for research in reading; and in the effort to invent a single instructional super-system stifle all other reading research development.
>
> Ellson considers, as we do, the statement of the goal as ambiguous. Is fourth grade reading performance to be considered predictive for adult reading tasks? Is fourth grade a crucial level or is it not possible that the objective of preparing all pupils for adult reading tasks may have no relationship to their performances at the fourth grade?
>
> The emphasis upon invention of a new instructional program ignores the possibility that some current programs could, under suitable conditions, produce far more achievement than they do at present. Perhaps more attention should be paid to the conditions under which some present programs are successful rather than to finding a new approach which presumably will supplant all existing systems.

Gephart (1970) answers these criticisms, for the most part fairly well, by pointing out that:

> the convergence technique can be expanded to include development as well as research

that existing instructional practices will be examined and tried out in special research projects to determine whether they can produce the goal of the Targeted Research and Development Program

that probable costs of the program in 5635 man-years and 292 million dollars in a twenty-year period are included in the total report. [However, he does not answer Ellson's question whether this represents a large or a small proportion of all the money available for reading research during this period. Gephart's answer that because many professionals would be involved, this project could not dominate all reading research is not an adequate answer.]

Finally, Gephart acknowledges the ambiguity in the goal statement, but repeats that aim in saying that the direct goal is the education of children so that by the age of 10 they will have acquired the reading skills necessary for the successful performance of significant adult reading tasks. This goal is a dubious one, as we have tried to point out.

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READING VERSATILITY TWELVE YEARS LATER

In selecting this period of time, no implication is intended that previous researchers were not concerned with reading flexibility, nor that its importance as a characteristic of reading had not been noted. As Spache (1969) and Wark (1965) have shown in their reviews of research trends some of the studies of more than thirty years ago seem advanced beyond the views of even some contemporary "experts." The twelve year period was selected because that is roughly the time span since the presentation of my first paper on reading versatility to this conference.

If one recalls the papers which were being presented in the Fifties and even into the early Sixties, one will realize how relatively primitive we were then in our thinking concerning reading flexibility (McDonald, 1965). Despite the appearance of pioneer papers which were beyond their time in their outlook, the majority of writers can be described as producing what Wark (1969) has termed "Reports to the Dean."

While the importance of reading flexibility was acknowledged, the main goal of most reading training was increase in rate. In fact, reading flexibility itself was defined in terms of rate flexibility.

Let us look back at what at least some of us were saying in the late Fifties.

> One of the most important characteristics of the good reader is flexibility. He changes his reading speed and approach to suit his purpose for reading. He varies his rate and method of

> reading to accommodate differences in style of writing, level of difficulty in content and amount, and quality of his background knowledge of the subject. (McDonald, 1958)

That introduction to my presentation to the Seventh National Reading Conference differed from what others were saying at the time mainly in adding "method of reading." Reading articles on college and adult reading instruction, reading workbooks, etc. were advising students to "shift their reading gears."

Rate flexibility rests on the fundamental assumption that readers can change their reading rate at will without also changing their purpose for reading and secondarily assumed that by telling a student to read faster that he would both do so and would read with better comprehension.

Reading research, however, does not support these premises. Tinker (1969) has pointed out repeatedly that not only do eye movement patterns vary according to the kind and difficulty of material read, but also that the presumption that changing external motor factors would bring about changes in reading performance is unwarranted. Tinker also asserts that camera measures of reading reflect the same results as in a "natural reading situation."

Redefinitions became necessary as research revealed the increasing inadequacies of the widely held concept of reading flexibility. It became increasingly difficult to view rate flexibility as an operationally viable concept. Research aimed at determining whether is was possible to consciously vary rate in the reading process demonstrated that it is no great trick to push around measured reading rate (Wark, 1969). The consequences, however, did not usually lead to the desired results in reading performance. Also, neither rate nor comprehension as constructs can be conceived as important ends in themselves. The rise of the "speed merchants" was in part aided by overemphasis in this direction.

As Kingston (1969) has stated, a major problem in reading research has been and remains the vagueness and ambiguity of the terms used in describing basic behavior. He singles out comprehension as one term which causes particular difficulty.

Because of the confusion associated with the term reading flexibility and its strong link to the simplistic rate approach, we prefer to use the term reading versatility. Reading versatility is intended to describe the ability on the part of a reader to utilize those patterns of processing reading inputs which are appropriate for the style, difficulty level, content and theme of the reading material at hand, while also being consonant with achieving the reader's purpose (s) to the optimum level of his physiological and psychological performance. In our view, reading versatility is an essential goal of reading instruction.

As Davis (1962) and others (Kingston, 1965; McDonald, 1958) have indicated, it is not sufficient to measure reading performance on a single test. Rather, measurement must be made under conditions which clearly define the purpose for which the reading is being done, with quite different instruments being available for assuring that the several important but very different purposes for which reading is done are in fact achieved. This was the object of our first versatility instrument. Viewed over the relatively short span of twelve years, the instrument proved deficient in important respects and required substantial revisions.

In refining and improving it, we found that, from the standpoint of assessment for reading versatility, readers may be considered under the following descriptive categories: crippled; ineffective; effective; efficient. Of course, these categories are not mutually exclusive, and individual readers may manifest reading behavior on different kinds of material and under differing circumstances which falls into two or more of such categories. These categories also involve emotional freedoms as well as cognitive skills.

Using the above categorizations, a reader may be effective without being efficient. He cannot, however, be efficient, but not effective. Furthermore, both effectiveness and efficiency may be found for different readers to be specific to particular kinds of reading situations. A number of investigations have shown that readers who possess reading versatility have attained such reading efficiency mainly on their own rather than as a result of planned instruction. It appears as if five to ten percent of readers possess reading versatility.

It seems to us that this outcome is largely due to the following mistaken assumptions identified by Spache as prevalent in the past and which in part are still with us: rate of reading considered a single type of behavior; rate training results in better comprehension in general; repeated practice in answering questions of a varied pattern based on brief reading selections will produce permanent gains in comprehension; comprehension itself will be fairly constant from one kind of reading material to another.

In the past few years, as Spache and others have shown, research has shifted to the study of teacher role and student personality, to the significance of student ambitions and self-concept as well as self-expectation. A number of studies report relationships between personality traits and characteristics and reading ability. Wark (1969) has pointed out that little is known about the rate at which students read their textbooks in a free situation and that, obviously, a much broader survey of reading and sudy behavior under natural situations is called for.

Considering this and other research, Spache (1969) sees the increasing use of counselling-oriented practices. Such reading practices recognize that reading is an intellectual task characterized by insight and planning, and that the variety of causes of reading ineffectiveness and inefficiencies make group instruction unproductive.

Christ (1969) has pointed out the fundamental need to assess the student's reading behavior, help him understand his performances and assist him in undertaking planned programmed activities which will enable him to improve. Accompanying this shift in instructional approach are materials and procedures which continually demand planning of reading approaches by the reader. The reader is constantly evaluating his performance in situations as stress is placed on shifts in behavior according to the demands of the task. Post-training tests as measures of absolute gain are de-emphasized in favor of work samples and student-counselor evaluation process based on many kinds of assessment. Spache (1969) wryly observes that the above cannot be accepted as fully descriptive of current practices.

Despite Davis' (1962) warnings and Kingston's (1965) penetrating analyses, we still have with us an over-emphasis on use of the four or five tests which were current fifteen to twenty-five years ago and which measure one kind of reading with partial scores of rate, comprehension and vocabulary. Unfortunately, it does not seem to be fully realized that assessment of a person's improvement in reading is even more complicated and beset with traps than the difficult task of determining his original levels of reading ability.

Assessment of reading performance, we believe, should focus on reading versatility. Measures of reading versatility should evaluate the ability of persons to read in a number of task-oriented ways, determine their effectiveness and efficiency at a number of instructional levels under a variety of "sets". In this evaluation we need to determine: under what conditions and with what kinds of reading materials the student is an effective reader (i.e. able to satisfy his purpose or purposes for reading); whether the student is an efficient reader (i.e. able to achieve his reading purposes with appropriate expenditure of time and energy); and the ability of the reader to vary his strategies, tactics and techniques of processing input from written materials to meet the demands imposed by different purposes and different reading situations.

We believe that the Reading Versatility Tests as developed and refined through research and use over the past twelve years can be useful in assisting instructors and students in this kind of assessment. We emphasize that these tests must be supplemented with other kinds of assessment. Maxwell (1969) rightly calls attention to the limitations with regard to assessing skimming and scanning improvement noting that they are shared by all existing tests. In our opinion, Raygor's work in this area should be watched with interest.

Re-emphasis of the need for a much broader study of reading behavior under natural situations seems appropriate. Knowing how a student does on a reading test gives little information on how he actually reads while studying. We may simply be showing that reading course techniques result in gain on reading test performance. On the other hand, the more kinds of reading behaviors which are sampled, the sounder the extrapolation to the behavioral situation which the investigator is attempting to determine.

Of crucial importance, then, is as thorough an assessment as practicable of a student's initial reading status, including interacting, nonacademic factors, in a variety of reading situations. Such an appraisal of reading performance cannot be satisfactorily made, unless the educational objectives of the school have been defined in operational terms. Account must also be taken of institutional press. Does the student need to read? Perhaps he is told all he needs to know to pass his courses. Perhaps reading plays a subordinate role for him. While we do not contend that a person is better for *not* being able to read efficiently, nevertheless, for many students, reading does play a small role in their lives.

Measurement of reading performances, then, requires the selection of instruments suitable to the type and amount of appraisal wanted. It demands the assessment by a trained person of the data collected. The interpretation must take into account the sad truths that deductions from a priori reasoning are often not borne out in human performances and that statistically signifiicant differences are often not educationally important.

Raygor (1967) has illustrated at a previous conference the problem of the relationship between data collecting and data integrating in the contextual setting of a useful approach to reading problems.

As Kingston (1969) has so provocatively asked "... [is] it the reading process which is complex, or is it the human being who responds in a complex fashion?" Perhaps the extent of our progress in twelve years is our ability to ask ourselves this kind of question.

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EFFICIENT READING–A WAY TO PERMANENT EDUCATION

With the need to ponder the implications of sweepingly dramatic and traumatic events that today's life headlines, educators can miss, or quickly dismiss, the significance in our tasks of the seemingly minor incidents tucked in between. Incidents such as these:

> Welcoming a group at a reading convention, the mayor of a west coast resort area said, "I am glad you are teaching people to read because we use brochures and folders to invite people to our city." His tongue was only part way in his cheek. A glance at hotel lobby literature would suggest he could have said, to lure people to our city rather than to invite.
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> A new television advertiser's manual was distributed at the opening session of a short course. It stated that children become living, talking records of what advertisers tell them each day. The statement was one of smug assurance. One has only to visit one department store Joyland Toyland at this time of year to realize the manual could say that children become much more than living records of what advertisers tell them. They become slaves and missionaries.
>
> Pinned to the hanging effigy of a federal politician in the window of The People's Bookstore in a small Canadian city are the words "Down with Fascist leaders." A passing citizen was attacked by the proprietor with a broomstick because he stopped to shake his head in disapproval. The local press report of the resulting court proceedings highlighted the proprietor's aggressive attitude during the hearing. The implication that he

was being unjustly persecuted rather than justly prosecuted was not offset by any press report of the reasons for the original headshaking over the kind of literature in the bookstore and the way it was displayed. "That's good" some might say, "for it means less publicity for the books, so fewer people will be spurred to buy and read them. And their not reading will be good because so many are ready to believe and follow any anti-anything propaganda."

On the back of a month-old circular appealing for contributions to help innocent victims of violence half a world away, a group in a community college town printed a call to violence on their campus. "Now is the time for us to take control of our own university!" Some thirteen-year-olds, who were on campus at the time exercising their new freedom to decide whether or not to attend classes at the junior high down the street, sat on the steps and read the call to violence. A school supervisor who was also on campus that day to visit the college reading center, paused in the hall and read it. The college president read it as he left an emergency faculty meeting called to discuss a ten-point student manifesto, heard against the chant outside of "Do the few of you in there know how many of us there are out here?" Each interprets the hand-out in terms of his own emotional context.

Because it is considered most profitable to feed appetites for news of misadventures and mistakes, we may have no opportunity to know of equally significant incidents such as these:

A teacher made her grandmother laugh out loud as she shared with her a nursery school four-year old's story of the birth of a calf in Uncle Larry's barn. The climax line was "and it was a happy time for all, except I think the father should have been there".

A painter of seascapes put down his brush and took up his pen to draw from his experiences some guidelines for would-be and less practiced painters.

The father of an aphasic child took new hope as he read about the promising effects that a newly researched drug appeared to be having on the communication problems of some aphasics.

And a bus driver, with a three-week vacation, instead of two this year, packed with his fishing gear five paperbacks – *Inside the Third Reich, Fly-tying Made Easy, Moonriders of 2001, Mass Media and You* and *The Way It 'Sposed to Be.*

All of these are simple incidents. No one of them may seem to mean much. Put together, they point up the fact that there are exerted today on the minds of all our people the power and influence of a parallel system of education which has increased tremendously through the past two decades, partly because of the growing size and wealth of industrial enterprises, but more because of new technological developments. Photography, colour printing, radio and T.V., chief among these developments, mean we now have literally hundreds of beautifully produced, attractively illustrated colour magazines, thousands of cheap but attractive boks, limitless numbers of programs accessible through movies, radio and T.V.—all of them aimed at millions of people. Through new and compelling channels many groups, largely commercial and industrial, are educating and miseducating the people of modern nations.

Wealthy and powerful groups and enterprises fill the communication channels with messages that encourage people not merely to waste their time and resources but often to do so in a way that degrades them, and that is harmful to their physical, moral and spiritual health. They often work in direct and planned opposition to modern systems of education rendering the work of the professional educator useless and leaving the people confused and bewildered, ready to criticize or follow anything.

There are encouraging influences and developments. As a result of the new technological devices, millions can enjoy plays by great authors, good music and art, and become well informed about other lands and peoples, and about modern advances in science and mathematics. Some argue that all this merely levels standards and taste, but I believe that in fact it raises the level.

It is a challenging and wonderful time to be a professional educator. It is a right time for professional educators with particular concern for reading to strengthen our commitment to extend and improve reading programs and services in our schools, and to testify loudly and convincingly to the values and satisfactions of efficient and continuing reading.

Most members of this Conference have developed specialization in reading. You require no tests to prove that I can scarce distinguish a consonant blend from a dyslexic. I might not recognize a tachistoscopic aide if one came to stand here beside me. Through all the years I have worked in education I have been, however, very much involved operationally in reading. For I have a deep personal belief in the significance of reading and of readers in life, and so in school. In my present charge of administering education in a provincial school system, I consider it my first responsibility to assure that each child has the best possible chance to learn to read to the best of his potential ability, and that he has his own right kind of help in this important process when he needs it.

We are undertaking in our school systems to develop more comprehensive and flexible programs, reflecting a society that values self-determination. We want each child to be able to select, with competent guidance, a progressive sequence of learning experiences, meaningful in terms of his abilities and interests. I accept the logic of individually planned programs; yet, I believe the significance of the reader today and in the future is such that, in this aspect of schooling we must provide, and if necessary compel adequate exposure. It is our responsibility to assure that no one leaves school today unequipped to read, unmotivated to go on reading, lest he prove unable to live, to adapt and to help shape the good tomorrow.

I say "select with competent guidance" and "compel adequate exposure" with firm conviction of common sense.

I think it is nonsense to say that we violate each child's right to be himself and to behave and learn as a creative individual if we provide planned guided learning experiences. No one creates out of nothing, and [illegible] is our job to see the child has the mental, aesthetic and emotional materials from which to create his own unique products. There are also rules and conventions to be learned if freedom is to be meaningful. Used as tools to facilitate creativity, these guidelines stimulate creativity rather than retard it.

I am not ready to take chances with unstructured, undirected, unevaluated development of the skills of efficient reading lest, as one educator put it, we preorder chaos in the classroom and foredoom children to less than their best facility for life.

A student, asked to put down on a record card his expected mark in a course he was beginning, put down C. In an interview, the teacher expressed concern at this retreat to safe mediocrity. "Make no little plans", the teacher said. "They have no power to serve men's ends. Make big plans".

Not only as individuals working in reading, but as an organization of professional people concerned for reading, we should encourage children and teachers to make big plans for developing efficient reading and then work hard and specifically to help them achieve them.

I believe there are issues and problems in reading on which the influential and knowledgeable should take a stand and initiate action. Departments of government spend large amounts of money to guide young and old on how to stay physically alive and whole on the highway, and how to avoid drugging the senses through pills and powders. Can we act to bring about comparable use of the media to advise on how to stay mentally alive and whole, how to avoid drugging the mind with indiscriminate acceptance of whatever others choose to inject?

To beguile the unwilling and disinterested into reading, publishers are producing literature that depicts and analyzes the turned-off, turned-on, opt-out, non-this and anti-that and, it must be added in all fairness, the questioning, the striving, the challenging. From these kinds of interests, teachers need help and materials to inspire and guide children to an appreciation of reading that can lead them off the depressed-area street, even off the hockey ice and racetrack. Who will lead the way in extending read aloud sessions up through the school? How better can we steep the language-deprived and disadvantaged children in the richness of word and thought and experience that those more wealthy in opportunity have had? It is important to widen the horizons of today's youth before we ask them to decide about where we are and where they would go.

Joy in reading is not taught or lesgislated. It is inspired, quickened, activated by a teacher who knows the joy of reading. How can we inspire, quicken, activate teachers' own love for reading so they can have the right motivation and then develop a keenness for reading in the children they teach?

I pose these specifics in light of my topic "Efficient Reading—A Way to Permanent Learning", and my deep concern that school will assure as fully as it can for each child the enjoyment and satisfaction and capacity for self-determination that permanent learning fosters.

At a time when the habit of change is becoming the mark of our century, we ned no more statistical quotations about non-reading delinquents and non-reading dropouts from retraining programs; we need no warning of the early application of the Peter Principle to professional and non-professional workers unequipped to keep up through rapid critical and creative reading and listening. We accept without question the vocational implications of inadequate reading skills and interests.

It is less easy to document the significance of reading abilities in coping with the present problems of our increasing leisure. Longer vacations, more frequent lay-offs, staggered shifts, earlier retirement call for a redefinition of leisure. Many of us are too inclined to accept the assessment of pleasure in freedom from work thrust at us by vested interests in snowmobiles, golf-carts and go-go girls. We promote a new malaise if we increase time to go and do and see when we cannot increase the physical, emotional or financial stamina needed to go and do and see. Survival amid the crowds of today's places, peoples and pressures may come best if we explore more thoughtfully the appeal of a place of our own, and realize a changing idea of leisure as that place of our own becomes more often a mind of our own. We must make it possible for our steelworkers and clerks and doctors and computer programmers to follow the English countryman to the community library and a quiet place for reading.

A CBC interview program featured recently a twenty-two year old who was living in Toronto on twenty dollars a week for the satisfaction of proving it could be done. "I live in the library," he said. "True, I long for such things as the live theater and the lively lounge, but I can survive as a person without any of these things if I live in the library." Efficiency, and so pleasure in reading, can make reading itself a way to live one's leisure. Reading is a free self planned course to other ways to satisfying leisure experiences—a course with no "Sorry, registration closed" on the door. The only prerequisite is the ability to read well, and so to read willingly and purposefully.

At work or at leisure, as a member of the local, national and world communities, the person who would be himself today should have the ability to read well as a way to permanent learning.

The age in which we live may be called by historians the age of uncertainties, an age of unfixed beliefs and standards. Older mores and habits of living have been found wanting, and up to the present time we have managed to establish firmly nothing to take their place. We are like Christopher Columbus. He didn't know where he was; and when he got back, he didn't know where he had been.

Some of us can remember when a person grew up and grew old in what was essentially the world into which he was born. Today even the young forget quickly the world they are born into and no one expects to die in the world in which he works in his mature years. The pace grows apace, as the world, accustomed to change, demands it and delivers it. Each day brings its glimpse of new and startling changes which present new challenges, necessitate new adjustments in our thinking and our actions.

More and more services today are being provided by government and less and less by the individual. Most people expect and find an easy feeling of security. Something goes wrong, a job disappears, mortgage rates change, the weatherman says 'snow' and it rains,—the government is to blame. The state accepts responsibility for full employment and welfare, formerly enjoyed only by exceptional people. Most people want complete security and at the same time want complete freedom to do as they will; not will themselves to do what they must. The question is—Do we want less services and more freedom as individuals or do we want more services and less freedom? Have we the artistry of leadership to provide both? . . . the discipline of character to possess both?

We are presently being synchronized to the administrative convenience of computers at a time when most of them are having teething troubles. Technological innovations and clever use—or abuse—of improved systems of communication are creating many images and idols. Our material progress and our powers of communication have outstripped our power to discriminate and sort out the good from the bad. We have shown an almost complete lack of ability to determine the economic and social effects of our new inventions. Our technical power has outstripped our philosophical, economic and social power.

In immature and untrained hands power makes people like a dog with a flea—they itch all over.

Our health is being undermined by new artificial fertilizers and pesticides. We have polluted the soil, the sea and the air. We have given little thought to the damaging effects on the life of the individual of our chemical and radio-active wastes. Our modern drugs which cure one disease may go on to cause a worse one.

We are creating a variety of escape hatches and rarely realize how many of them are quickly turned into booby traps by clever profiteers. They can afford to spend freely of time and money to use mass media which lure and coax us to buy, vote, go and pay as they convince us we want to do. A certain percentage of our population is most of the time under the influence of either stimulants or sedatives. People with black hair are having it dyed whit; people with white hair are having it dyed red. Some have several kinds of hair. Sometimes it is difficult to tell your grandmother from your grandchild or your sister from your mother-in-law or your brother-in-law. Hair is getting longer, pants are getting tighter, while the mini-midi-maxi conflict escalates and vacilates.

The trained and disciplined mind and hands of a surgeon can save life in one particular field. Untrained minds and undisciplined hands can destroy life in any field. It is difficult for some to see both sides of the picture at the same time. The pollution of our water fills us so full of fear that we fail to think that polio, smallpox and diphtheria have been virtually eliminated. Concerned that man pollutes and destroys, we forget that he also cures and builds.

Must the present attitude of questioning everything be interpreted to mean that our world is coming to an end? Can we find in today's questioning attitudes, even in today's doubts and fears, greater assurance that civilization will continue, and continue with the prospect of refinement and improvement?

Can we ensure that the increasing power over our lives, necessary if we are to feel more secure, is given to people who know how to use it for the common good?

It is a challenging and wonderful time to be professional educators.

It's a time for developing individuals who should and can be free. To make people more secure is probably good. Stronger, more powerful governments are an inevitable concommitant. To be secure and yet remain free to be self-directing, the individual must have the ability and the opportunity to know both sides of any situation: he must be prepared to make morally responsible judgments and decisions.

It's time for developing individuals ready to do their own perceiving, their own thinking, their own concluding—people who are life-long learners, determined to be masters, not servants, of their own technological advance. We must try to help develop the most wholesome qualities of mind and spirit, those skills and habits of thought that make up the aims of teaching efficient reading and listening, in the fullest senses of the terms.

Combined with these qualities and skills, we need an intelligently questioning attitude that seeks behind words for purposes and prejudices, that distinguishes fact and opinion, that relates causes and effects, that discriminates between emotional display and logical argument. We need the will and wisdom to use whatever is heard and read as springboards for our own ideas.

In a world that bombards with word and image, people need the will as well as the wisdom to read—because it is through continuing, selective reading that the individual and society can continue to learn and so maintain the right to be self-determining.

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CRITERION REFERENCED ASPECTS OF THE CARVER-DARBY CHUNKED READING TEST

A chunked type of reading comprehension measure was suggested by Carver (1970a), and subsequently a standardized chunked test of information stored during reading has been developed, evaluated (Carver & Darby, 1971), and analyzed (Carver & Darby, 1970). Recently this test has been published as the Carver-Darby Chunked Reading Test (CDCRT) have been discussed in relation to the traditional multiple-choice type of reading test and to the cloze type of test (Carver, 1970b). Not explicitly discussed in previous journal publications are the aspects of this test which are relevant to criterion-referenced measurement (See Carver, 1970c, or Popham & Husek, 1969). The purpose of this presentation is to briefly discuss the development of the test and what it proposes to accomplish from the standpoint of criterion-referenced measurement.

Traditionally, standardized reading tests have been developed to measure individual differences with respect to reading performance. The test items for these tests have usually been selected to maximally discriminate between individuals. That is, items with *p* values around .50 have been selected because they are most efficient for discriminating among individuals whereas items with *p* values approaching 1.00 or .00 have been eliminated because they do not have discriminating power. The research and development of the test also includes the establishment of a norm-group set of scores which is used as a standard to interpret individual differences on the test. Thus, the traditional measures of reading have been "norm-referenced."

The CDCRT differs from the traditional reading test in two ways. It was not developed to maximize individual differences, and test scores are not compared to a norm-group set of scores in the traditional fashion. Rather, the test was developed and revised so that: (a) a group of readers *could not* answer test items correctly *before* reading the passages, and (b) a group of readers *could* answer test items correctly *after* reading the passages. In operational terms, this meant that an item was revised if over 33% of a nonreading group answered it correctly or if less than 67% of a reading group answered it incorrectly. Thus, the test items were developed to discriminate between a reading group and a non-reading group. The techniques of criterion-referenced measurement were used to develop the test so that when an individual gets an item correct, it is reasonable to infer that he stored this information while he was reading the passage. That is, a change has taken place as a result of reading.

The techniques of criterion-referenced measurement are also evident in the interpretation of the scores on the test. An individual receives three types of scores on the CDCRT. The most important score is the Efficiency score, i.e., the number of incorrect chunks, out of 100 possible, that the individual correctly identifies during the 25 minute test period. The other two scores are Rate and Accuracy. Rate is the number of the last item attempted and Accuracy is the percent correct, i.e., the Efficiency score divided by the Rate score. The CDCRT consists of five reading passages, each of which is immediately followed by a chunked test. Each test consists of 20, 5-alternative items where one alternative in each item is incorrect. Table 1 contains information extracted from the section of the test manual concerned with interpretation of scores. As is evident in Table 1, each of the three test score variables has been dichotomized to produce the following categorizations of mature readers: Efficient-Inefficient, Rapid-Slow, and Accurate-Inaccurate. The Rapid-Slow cutoff point was selected to be 60-61. If an individual completed reading and answering not more than the first three passages and their corresponding test items (60 or less), then he was arbitrarily categorized as a slow reader. If an individual attempted Item 61, then he had also read Passage 4. Thus, he was probably more than a small increment faster than those individuals who had only finished 60 items. The Accurate-Inaccurate cutoff score was arbitrarily set at 67-68%, the same cutoff used for the initial revision of test items. The Efficiency-Inefficiency cutoff score of 40-41 was determined by multiplying the 67% accuracy by the 60 item rate. Thus, this cutoff allowed no overlap between the category of Efficient, Rapid, and Accurate readers and the category of Inefficient, Slow, and Inaccurate readers.

Table 1 contains the six possible categories of mature readers. ("Mature reader" is a term used to describe the general type of reader who has progressed beyond the initial phases of learning to read and who is now reading to learn.) The Efficiency of a mature reader is

Table 1

The Six Categories of Mature Readers
(After Darby & Carver, 1970)

Accuracy	Rate	Efficiency	Six Types of Readers	Percent Readers (N = 143)
Accurate (68% or greater)	Rapid (61 or greater)	Efficient (41 or greater)	Type I	60%
		Inefficient (40 or less)	(Not applicable)	NA
	Slow (60 or less)	Efficient (41 or greater)	Type II	20%
		Inefficient (40 or less)	Type III	7%
Inaccurate (67% or less)	Rapid (61 or greater)	Efficient (41 or greater)	Type IV	3%
		Inefficient (40 or less)	Type V	3%
	Slow (60 or less)	Efficient (41 or greater)	(Not applicable)	NA
		Inefficient (40 or less)	Type VI	7%

made of two components, his Rate and Accuracy. Therefore a mature reader cannot be Rapid and Accurate and be classified Inefficient. At the same time, a reader cannot be Slow and Inaccurate and be Efficient. This would be a contradiction in terms. This situation is evidenced in Table 1 by the "Not Applicable" in cells referring to these inappropriate combinations.

The CDCRT test manual has not provided norm-group data with centiles for each possible score. Instead, the last column in Table 1 presents the percent of experimental subjects (N = 143) who have fallen into each of the six categories of reader types (See Darby & Carver, 1970). This is different from traditional norm-referenced measurement in that there is no suggestion that the group of experimental subjects is representative of any particular group in a normative sense. That is, although this group is a sample of mature readers, the sample was not systematically drawn with the intention that these percent values be representative of all mature readers or even all college students.

Traditional reading tests provide a continuous scale of individual differences with no suggestion of cutoff points to help diagnose inadequacies that might be successfully treated or to help researchers study certain types of readers. On the CDCRT, each individual has been placed into a category which suggests that his reading behavior may be like the other individuals in his category and different from the individuals in other categories. This categorization is tied to the absolute criteria of efficiency, rate and accuracy.

It should be recognized that there is no empirical research which supports the validity and fruitfulness of this particular categorization. However, the criterion-referenced aspects of the categorization suggest several interesting hypotheses that could be tested. Listed below are the six types of mature readers with several accompanying statements, which may be considered as speculative judgments or tentative hypotheses to be tested. It is obvious that research is needed to evaluate the following six types of mature readers.

Type I. Efficient, Accurate, Rapid Mature Readers are those readers who are most representative of the college population. That is, they tend to store and retrieve information at a rate and with a level of accuracy such that they probably have no difficulty with the normal course load in curricula requiring extensive amounts of reading. It is doubtful if this type of individual would benefit greatly from reading instruction.

Type II. Efficient, Accurate, Slow Mature Readers are probably the next most frequent type of college reader. That is, they are efficient in their reading, but their efficiency comes from their slow but sure performance rather than from their speed of reading. This type of reader is most likely to benefit from training designed to increase his reading rate. However, it remains to be demonstrated that the reading rate of a mature reader can be increased without concommitant decrease in accuracy of the information stored.

Type III. Inefficient, Accurate, Slow Mature Readers are quite likely sacrificing speed for increased accuracy of retrieval. Yet, they may be reading at their own optimum or effiicient rate. It may be difficult to improve their efficiency by reading instruction, although they are probably the most frequent type of reader who seeks such help. Their most desirable alternative may be to proceed through college with a load less than normal.

Type IV. Efficient, Inaccurate, Rapid Mature Readers probably sacrifice accuracy of information retrieval for an increase in amount of information exposure, although they still are efficient as arbitrarily defined by this test. This individual may be able to improve or optimize his efficiency by decreasing his reading rate. Reading instruction for this individual may be wisely directed toward altering his reading strategy since he may be skimming material that requires reading.

Type V. Inefficient, Inaccurate, Rapid Mature Readers may be able to become efficient readers by learning to decrease their rate to improve accuracy. It seems likely that reading instruction for these individuals should put more emphasis upon making the reading rate fit the nature of the reading purpose. Accuracy and effiiciency may automatically improve with a decrease in rate.

Type VI. Inefficient, Inaccurate, Slow Mature Readers are probably least likely candidates to improve markedly with reading instruction. Their deficiency probably results from a lack of adequate background information or knowledge. If an individual is only of high school age, then he may be an inefficient reader simply because he is not a mature reader and further progression in school may provide the background necessary to become efficient, accurate, and rapid. If an individual is of college age or above, then the score may simply reflect that he has not stored the amount and type of verbal information that is necessary as a prerequisite. That is, he may not have the reading vocabulary or the background context necessary to store and retrieve the verbal concepts and ideas represented by the reading level of the test material. There are many possible causes for reading scores in this category, e.g., low motivation and inadequate vision. However, for many of these individuals, the most fruitful strategy for improving reading efficiency might be to gain more experience and background by reading more college level material.

In summary, the CDCRT has been developed through the application of techniques of criterion-referenced measurement. This was accomplished by revising items on the basis of the performance of reading and nonreading criterion groups. Also, six types of hypothesized criterion groups have been developed to facilitate the interpretation of the individual scores on the test. Finally, the hypothesized attributes of the six types of mature readers have been presented in some detail in an effort to stimulate definitive research related to these hypotheses.

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MEASURING READING COMPREHNSION: AN HISTORICAL PERSPECTIVE

This paper is the result of an investigation of the history of the measurement of reading comprehension, undertaken to ascertain whether there has been a continuous process of development, improvement and increased knowledge in that area over the past fifty years or whether there has been merely a continuous re-discovery of old ideas and a continuous search for the elusive, defiinitive theory of reading which can serve as a basis for all measures of reading comprehension.[1] As will be shown, the results of my investigation suggest that the latter more accurately describes the situation.

It would be impossible to say exactly when the measurement of reading comprehension began; for to answer that question, we would have to determine the first time a graphic symbol was interpreted by a reader, who then demonstrated through subsequent behavior that he had understood that message. The question is obviously unanswerable.

But we can hypothesize that from the very beginning the reader's comprehension was determined in great part by his purpose for reading. Reading comprehension, before the scientific advent of measuring instruments, was probably determined by how well a reader achieved his purpose when using print as a medium.

With the scientific advent of standardized measuring instruments, the search for the psychological construct we refer to as reading comprehension got underway and the reader's purpose for reading was almost entirely forgotten. It is quite probable that early attempts to measure reading comprehension were based on prior development of intelligence measures. Early measures of reading comprehension attempted to measure reading comprehension as if it were a general behavior that was the same under all conditions.

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[1] The author wishes to thank Michael Smith for his assistance in the research for this study.

The very earliest formal and informal measures of reading comprehension mentioned in the published literature were based on how well a reader could reproduce what he had read. For example, in 1913 Pintner reported a study which compared the oral and silent reading comprehension of fourth grade pupils. Pintner's method of measurement was to ask each child after he had read "to write down as much as he could of the matter read." In addition, Pintner's method included not allowing the examinees to look back after they had completed reading. Pintner's reproduction method is still employed today on the Silent Reading subtest of the *Durrell Analysis of Reading Difficulty* (1955). However, on the Durrell test the students only have to recite their memories orally and do not have to write them.

In 1914, Brown published three criteria for reading measurement: rate of reading; quantity of reproduction; and, quality of reproduction. The first reading comprehension tests published seem to meet the first and second of Brown's criteria but not the third.

It has been fairly well documented that the *Gray Standardized Reading Paragraphs,* published in 1915, was the first published reading test. However, this test included no measure of reading comprehension. Probably the first published reading comprehension measure was the *Kansas Silent Reading Test,* devised by F. J. Kelly and published about 1916.

The Kansas Reading Test resembles many of our group verbal intelligence tests of today. Two items from the list for grades 6, 7, and 8 will ilustrate this point:

> A farmer puts one-half the hay from his field into the first stack, then two-thirds of what is left into a second stack. Which stack is the largest?
> Below are two squares and a circle. If the circle is the largest of the three, put a cross in it. If one square is smaller than the circle, put a cross in the large square. If both squares are smaller than the circle, put a cross in the small square.

Reading tests today still bear a strong resemblance to group verbal intelligence tests. For example the Reading Comprehension section of the *California Achievement Test* (Tiegs and Clark, 1957) includes these items:

> "Good morning, little boy," said the policeman. "May I help you?"
> "I am lost and I cannot find my way home," said Jack. "Please help me."
> 14. The Policeman said,
>   1) "Call your father."
>   2) "I am in a hurry."
>   3) "I will take you home."

> The sheep were playing in the woods and eating the grass. The wolf came to the woods.
>
> 15. Then the sheep
>   1) went on eating.
>   2) ran to the barn.
>   3) ran to the wolf.

Other early reading comprehension tests, all published by 1920, were *The Courtis Silent Reading Test* (n.d.), *Monroe's Standardized Silent Reading Tests* (1919) the *Haggerty Reading Examination* (1920), and *The Chapman Reading Comprehension Test* (1920). The Courtis Test was a timed test in which a pupil was given three minutes to read as much as he could of a two-page story. He was then given the same story but this time it was broken into a series of short paragraphs. A set of five yes-no questions followed each paragraph and the student was given five minutes to answer as many questions as he could.

Monroe's test was a four-minute timed test in which the examinee was to read a series of paragraphs. Following each paragraph was a list of five words and the examinee was to underline the correct word according to information contained in the paragraph. An example from the test for grades 6, 7, and 8 follows:

> Nanook, once so full of life, now knew perfectly well that it was all over with him. Head and tail down, the picture of resigned dejection, he stood like a petrified dog. Draw a line under the word which best describes the dog Nanook. angry - frightened - hungry - down-hearted.

A procedure for measuring rate of reading comprehension very similar to Monroe's test is still used today. The Speed and Accuracy subtest of the *Gates-MacGinitie Reading Test* published in 1964 includ a series of paragraphs which are read by the examinee. Following each paragraph are four words, and the examinee selects the word which answers a question related to the main idea of the paragraph. For example:

> Eskimos learn to turn their kayaks upside down in the water and right them quickly. This manuever requires courage as well as
>
> weapons hours skills ever
>
> The Apache Indians were nomads. They preferred following game to growing crops. They chose to fight rather than raise sheep. The Apaches were
>
> hunters sheepherders farmers cowards

The Haggerty Reading Examination (1920) for grades 5 to 12 included a vocabulary test, a sentence comprehension test, and a paragraph comprehension test. The sentence comprehension test consisted of forty statements answered with a "yes" or "no." The paragraph comprehension test consisted of a series of seven paragraphs each followed by true and false statements. Timing was an important factor, as it was in all of these early tests.

The *Chapman Reading Comprehension Test* (1920) for grades 5 through 12 included a series of paragraphs. The examinee was told that the second half of each paragraph included one word which spoiled the meaning of the paragraph and a line was to be drawn through that word. For example:

> The primary characteristic of a hero is his sincerity: first and foremost he must believe in his cause. In the absence of such sincerity and without such belief, he will follow the straight path along which his hopes may be attained and his ambitions realized.

In recent years, the Chapman procedure seems to be being rediscovered in slightly different form. The *Stanford High School Reading Test* (Gardner, Merwin, Callis, and Madden, 1965) and the *Gates-MacGinitie Reading Test* (1964) both utilize a procedure in which examinees are to demonstrate their comprehension of a paragraph by supplying an appropriate word to complete a sentence. In both of these tests the word is to be chosen from a given set of choices. An example from the *Stanford High School Reading Test* follows:

> Just as a person's family helps him and stands by him in case of need, so does his clan supports him when he needs its 1 . This 2 may range from helping him collect the price of a bride to protecting his 3 should he incur the wrath of other clansmen bent on blood-vengeance.

1	1 friendship	3 aid
	2 money	4 strength
2	5 relationship	7 sharing
	6 guidance	8 support
3	1 wife	3 life
	2 posessions	4 property

The examples of early reading comprehension measures above demonstrate that the first two of Brown's 1914 criteria were generally being adhered to. Rate was certainly an important aspect of each of these tests and the measures were generally attempting to determine how well an examinee could understand a written communication. However, the third criterion, quality of reproduction was neglected. By contrasting these early reading comprehension tests with our tests of today, we might wonder how far we have come in improving our measurement of the quality of reproduction. Perhaps this is because these first tests, and our tests of today, limit the purposes for reading to the examinees' ability to achieve the test developer's purpose. Indeed, reading comprehension was usually defined during the early '20's as the process of thought-getting. "This thought-getting may consist in the mere understanding of sentences or in the interpretation of paragraphs or whole selections, or it may be a combination of all these factors [Gilliland and Jordan, 1925, p. 93]."

The earliest reviews of these reading comprehension measures raised many questions about what a particular test was actually measuring. For example the following criticisms of various reading comprehension tests appeared in the Buro's 1938 *Mental Measurements Yearbook*.

"A valuable feature of the tests on reading comprehension is the effort to measure the pupil's ability to make inferences from the material read. However, portions of the tests may measure intelligence rather than reading ability."

"The tests have been validated by customary intercorrelation with other reading tests but more especially by selecting test situations which 'represent the essential elements of the basic skills which are needed for success' in the work of the grades for which the battery is appropriate. . . . The comprehension test requires pupils (1) to follow directions, (2) to interpret meaning, and (3) to organize materials. In common with most comprehension tests, some of the items are open to criticism on the ground that they could be answered without having read the test paragraphs on which they depend."

"Although the authors state that they seek to measure the ability of pupils to interpret what is read and to make inferences, it appears that the questions used for this purpose require the reproduction of facts stated directly in the reading text rather than inferences made from these facts."

"However, if the tests on comprehension are broken down, it will be shown that comprehension of the paragraphs is measured by asking for: (a) details directly stated in the content, (b) details implied in the content (involving multiple-choice techniques, (c) 'yes' 'no' answers, (d) total meanings, (e) central thought, etc. These techniques have long been proven good, but this application to the paragraphs in either of the forms is not consistent. Some paragraphs are followed by only one type of question, if the two forms are compared, the inconsistency is increased more than ever. Another way of putting this point is to inquire, What is paragraph comprehension? Is it something that is to measured only through details in one instance, and a combination of several different techniques in another?"

It is distressingly obvious that most of these questions are still being raised today. For example, the following quotes are from Buros *Sixth Mental Measurements Yearbook* published in 1965.

"The first deficiency is the total lack of evidence regarding the factorial compositions of the reading tests. It is admitted that the tests measure a complex set of reading skills, but no evidence is forthcoming to support the contention that the chosen 'five major reading-for-comprehension skills' are major components of reading ability, or that the reading tests do actually 'weight these five kinds of skills approximately equally.' All we know is that a committee of authorities agreed on this breakdown of reading into component skills. With due respect for the committee, it would be highly desirable to have their judgments tested and supported by empirical evidence."

"A useful technique is to attempt to answer reading comprehension items *before* reading the selection (I wish the publishers would stop calling their selections 'stories'). On Form 1, grades 7-8-9, items 59-67, this reviewer answered correctly 8 out of the 9 questions about Switzerland without looking at the passage."

"The directions for administering and scoring are clear. The printing is good. Graphic profiles of subtest scores are printed on the front of each booklet. In fact, in most respects, the Tests 'look' like well-made standardized tests and this is perhaps what is so insidious. The teacher follows the directions, the students mark the booklet, the tests are scored, and Johnny gets a reading grade of 1.9. What on earth does this mean?"

The continuous search for the elusive answer to the question of what is reading comprehension probably encouraged the development of a vast multitude of reading comprehension measures. Indeed, the period from the 1940's to today could be labelled the time of sub-skills proliferation. Many tests merely labelled the same sub-tests with different titles. Others had similar labels but employed different question types. I recently collected a list of all of the subtests from reading tests which seemed to be attempting to measure reading comprehension. Most of these tests were published during the 1950's and 60's. My list includes the fifty subtests listed in Table 1.

Table 1

Subtests of Standardized Reading Tests Which Seem to Measure Reading Comprehension[a]

(After Farr, 1970)

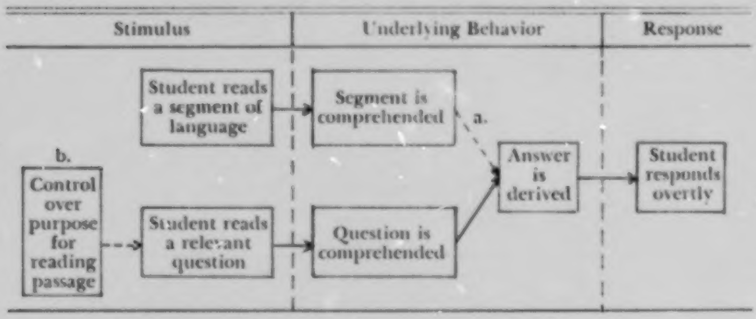
1. Context Reading
2. Sentence and Word Meaning
3. Paragraph Meaning
4. Comprehension
5. Level of Comprehension
6. Speed of Comprehension
7. Interpretation of Reading Materials
8. Interpretation
9. Organization
10. General Comprehension
11. Specific Comprehension
12. Reading to Retain Information
13. Reading to Organize
14. Reading to Evaluate—Interpret
15. Reading to Appreciate
16. Perception of Relations
17. General Information
18. Ability to Grasp the Central Thought
19. Ability to Note Clearly Stated Details
20. Interpretation
21. Integration of Dispersed Ideas
22. Ability to Draw Inferences
23. Recalling Information
24. Reading to Locate Information
25. Reading for Description
26. Rate of Reading for Meaning
27. Reading for Directions or Procedures
28. Sentence Completion
29. Retention of Details
30. Directed Reading
31. Comprehension Accuracy
32. Reading Efficiency
33. Reading
34. Noting Details
35. Interpreting Paragraphs
36. Following Directions
37. Reading for Inferences
38. Reading for Main Ideas
39. Summarizing
40. Skimming
41. Recall of Information Read
42. Gross—Comprehension
43. Comprehension—Efficiency
44. Ability to Recall Ideas
45. Ability to Translate Ideas and Make Inferences
46. Ability to Analyze Motivation
47. Ability to Analyze Presentation
48. Ability to Criticize
49. Reading for Information
50. Story Comprehension

[a] Note: Not included are the myriad of study skills; also not included are the wide range of vocabulary subtests which might in several cases be included with this listing.

What do all of the reading comprehension tests of today and those of the past seem to be measuring? In my opinion they have all attempted to measure reading comprehension as a "thought-getting process" which is generally unrelated to specific reading purposes. The series of diagrams in figures 1 through 5 illustrate the makeup of reading comprehension tests and how they are related to purposes for reading.

Figure 1

Reading Comprehension Measurement. (After Bormuth, et al, 1970) Direct measurement of item comprehension: implied measurement of passage comprehension.


Stimulus
Underlying Behavior
Response
Student reads a segment of language
Segment is comprehended
a.
b.
Control over purpose for reading passage
Student reads a relevant question
Question is comprehended
Answer is derived
Student responds overtly

a. In Bormuth's diagram, this line is solid.
b. This block does not appear in Bormuth's diagram.

The first diagram is an adaptation from a recent article by Bormuth Carver, Manning, and Person (1970). That diagram describes the usual procedure of having a set of questions follow the reading of a selection. The solid lines in the diagram indicate a direct relationship while the broken line represents an implied relationship. For example, in Figure 1 there is only an implied relationship between a student's response to a question and his comprehension of a reading selection.

Figure 2

Reading Comprehension: Poor Items. Direct measurement of item comprehension: No measurement of passage comprehension.

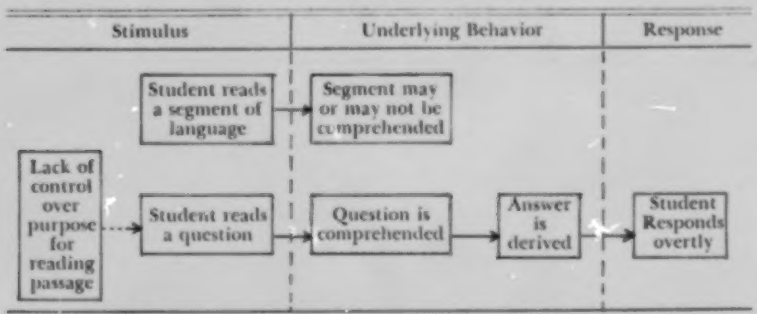

Stimulus
Underlying Behavior
Response
Student reads a segment of language
Segment may or may not be comprehended
Lack of control over purpose for reading passage
Student reads a question
Question is comprehended
Answer is derived
Student Responds overtly

Figure 2 illustrates an item in which the examinees are able to identify correct responses without reading a selection. It is amazing the vast number of questions on reading comprehension tests which exemplify this second diagram.

Figure 3

Reading Comprehension: Cloze. Direct measurement of literal comprehension.

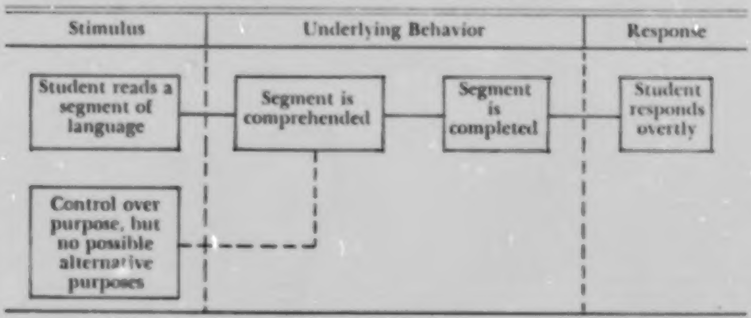
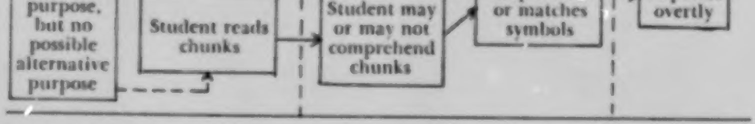

Stimulus
Underlying Behavior
Response
Student reads a segment of language
Segment is comprehended
Segment is completed
Student responds overtly
Control over purpose, but no possible alternative purposes

Figure 3 indicates the Cloze procedure in which a solid line establishes the direct relationship of response to comprehension of a selection. Figure 4 describes the chunked test which has been developed by Darby and Carver (1970).

Figure 4

Reading Comprehension: Chunked. (After Darby and Carver, 1970) Implied measurement of both item and passage comprehension.


Stimulus
Underlying Behavior
Response
Student reads a segment of language
Student reads chunks
Control over purpose, but no possible alternative purpose
Student may or may not comprehend segment
Student may or may not comprehend chunks
a.
Student either comprehends or matches symbols
Student responds overtly

a. If student may look back, this tests symbol matching: If he may not, it tests literal recall.

Each of these first four diagrams illustrates what I believe to be the basic problem with reading comprehension measures. The tests are being developed as if there was a well know theoretical construct called reading comprehension. Some of the most recent attempts at developing reading comprehension measures have emphasized that point. Schlessinger and Weiser (1970) and Bormuth (1970) have been vehement advocates of more systematic approaches to the development procedures which are based on the implicit language and organizational structure of a written message. Bormuth, in fact, concludes a recent study:

"The most startling result was the fact that large proportions of the children were unable to demonstrate a comprehension of even these basic structures by which information is signaled indicating that this deficiency may constitute a serious impediment to the efficiency of instruction. The structures identified seemed to represent homogeneous classes of behavior since the variation between questions measuring different skills was significantly greater than the variation between items measuring the same skill. The fact that the structures and question types differed significantly in difficulty was also taken as evidence that many of these skills may be hierarchically related [1970]."

Figure 5

Reading Comprehension: Related to purpose.

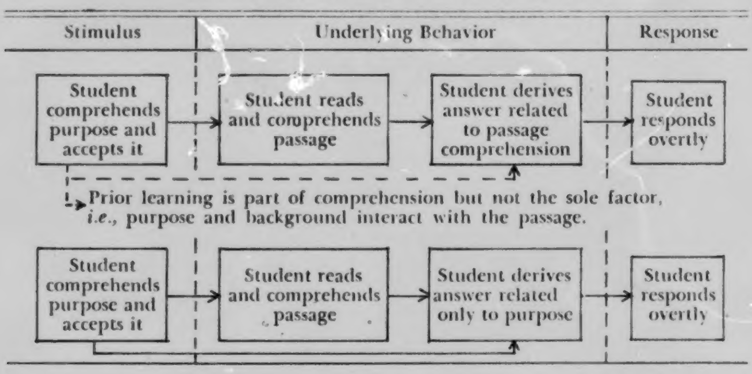

Stimulus
Underlying Behavior
Response
Student comprehends purpose and accepts it
Student reads and comprehends passage
Student derives answer related to passage comprehension
Student responds overtly
Prior learning is part of comprehension but not the sole factor, *i.e.*, purpose and background interact with the passage.
Student comprehends purpose and accepts it
Student reads and comprehends passage
Student derives answer related only to purpose
Student responds overtly

Figure 5 is the avenue which I believe may lead us off the track of trying to ascertain a general reading comprehension skill. This diagram, which is probably not a description of any existing reading test, includes a direct relation of purpose to the reading selection to a student's response to a reading selection based on the given purpose.

The approach that I am suggesting would not wait for tests to be developed until there is sound theoretical and empirical evidence concerning the components of reading ability as Kingston (1965) suggests. Instead we would begin to list, and organize reading purposes and tasks that lead adults and children to printed material. Measures would be based on these purposes and tasks. For example, we might include such tasks as having a child locate a phone number or determine from a newspaper when his favorite television program is scheduled. Certainly more complex purposes and tasks such as determining a character's motives to determine why he committed a certain act should be included. However, these purposes should be developed on the basis of meaningful reading tasks; they should be related to realistic purposes and should not be tasks that are derived from some authority's arbitrary decision as to what a reader's purpose should be.

It cannot be denied that the sophistication of test developers and test reviewers has increased tremendously. They have definitely learned to ask more probing questions about the theoretical construct of reading comprehension; they have been able to provide more sophisticated technical data on reliability, validity and norming procedures; the editing of test items has improved dramatically. But the essential questions are still the same: we are still asking what reading comprehension is and how it should be measured? The following questions about reading comprehension tests were raised in 1910; were reiterated in 1938; and are still being asked today:

1. Why is there such a great overlap between measures of hypothesized different skills of reading comprehension?
2. What format should reading comprehension measures take: multiple choice questions? cloze? fill in? long passages or short? should examinees be allowed to look back at a selection when answering questions?
3. What are the sub-skills of reading comprehension?
4. How strong an effect does prior knowledge of a topic have on an examinee's reading comprehension?
5. Does the language structure of a selection affect reading comprehension?

I suggest that these and other similar questions result in exercises in futility. The only validity of any importance is how well a test predicts a student's ability to perform functional reading tasks. Reading measures need to be developed which are based on specific reading tasks and purposes for reading.

Just as we have been generally disillusioned with our attempts to measure intelligence as a psychological construct perhaps we should also be disillusioned with our attempts to measure reading comprehension as a psychological construct. The measurement of reading comprehension should be based on an attempt to determine how well a reader can accomplish a given task with a given reading selection. From my perspective, the history of the measurement of reading comprehension got started on a narrow, single track over fifty years ago and has been chugging around in circles ever since. That is not to say that increased sophistication in the technical, scientific, and even artistic aspects have been non-existent. Indeed, some of the advances in those aspects have been quite dramatic, but the essential problem is that the train has never switched off the initial track, it has just had a streamlined engine attached.

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ASSESSMENT OF THE ACQUISITION OF INFORMATION FROM READING PROSE PASSAGES

The legitimacy of a concern for the functioning of reading tests as they are now known is underscored by a series of recent studies which revealed that in many cases successful performance on the reading measure was only loosely related to the necessity for the reader to have read the passage on which the questions presumably were based. Preston (1964) tested the hypothesis that college students would score better than chance on a reading comprehension test when denied the reading of the passage on which the questions were based. His affirmative results were replicated with children at the fourth grade level by Mitchell (1967).

A more detailed picture of students' ability to answer comprehension questions without the aid of the text from which they are derived is provided by studies by Weaver and Bickley (1967), Bickley, Weaver and Ford (1968) and Weaver, Bickley and Ford (1969). In a series of studies utilizing the black-out technique, one of the recurrent experimental conditions was that students were required to answer multiple choice items, sampled from reading tests listed in the Sixth Mental Measurements Yearbook (Buros, 1965), with the accompanying reading passage completely blacked out. In light of what one conventionally assumes about the function of a reading test, namely that it measures some variable related to the reading act, their finding is somewhat startling: "The Ss who had no reading passage to aid in answering the items, nevertheless, correctly completed 67% as many items as Ss with all the reading passage [Weaver and Bickley, 1967, p. 294]."

In order to evaluate the consequences of the above findings it is necessary to recall the distinction between a necessary condition and a sufficient condition (Carney and Scheer, 1964, p. 207). It can easily be granted that reading involves relating whatever is being read to prior experience. As such, prior learning is a necessary condition to reading, as long as a definition of reading includes a reference to understanding. The statement that prior learning plays a legitimate role in the answering of multiple choice questions subsequent to having read a passage, is quite acceptable. However, the fact that prior learning is a necessary condition for answering these items does not make it a sufficient condition. A reading test, for instance, is distinguishable from a listening test; in addition to the prior learning and knowledge present, some reading, and not some listening, takes place before the test is taken. In short, it seems reasonable to require that a reading test measure sets of behaviors which are functionally related to reading a passage.

HYPOTHESES

The data reported here were collected as a part of a larger study. (Tuinman, 1970). Of the hypotheses tested in this study the two following below deal specifically with the issue of passage dependency of reading items.

I. Under the passage-out condition, the mean scores for the four reading tests are not equal to or not smaller than the mean score to be expected on the basis of chance only.

II. Under the passage-out condition, the proportion of subjects passing a test item in the four reading tests is not equal to or smaller than the proportion to be expected on the basis of chance only.

INSTRUMENTS

The writer developed three experimental tests, each of which was designed as a measure of the degree with which individuals acquire information from reading a passage. Basic specifications underlying all three tests are as follows:

a. Test items must be unanswerable when the passages on which they are based are removed. Unanswerable means that the probability of guessing the right answer should not exceed .25 (within the limits of sample fluctuations).

b. The items must be answerable under the condition when the reading passages are present. That is, a typical distribution of item difficulties should be expected under the passage-in condition.

c. At face value the three tests must reflect three distinct approaches to measuring the process defined as the acquisition of information from reading prose passages.

Test of Acquisition of Information—Phantasy (TAI-P).

The passages in the TAI-P are pure phantasy, the product of the imagination of this writer. The test represents one way of cutting down on the role of real-life information, not obtained from reading, utilized in answering test questions. Though the stories are phantasy, no semantic distortions or other distortions of known relations among known events (including "things") are present in this test. Anticipation of events is possible in reading these stories as much as it is possible in reading fairy tales. An example would be:

> Though the Mogs are very afraid of tigers, the one animal they probably fear even more is the Mog-eating fishu. Fishu is of course the Mog word for fish. The fishu most certainly is a dangerous animal. It can best be compared to our man-eating shark, except that the fishu can last longer on land than any other fish known to us. In this respect he event outlasts the king mackerel. That is exactly why the Mogs are so afraid of him. Any enterprising fish who is in the right mood can come after them even if they stay away from the water. Altogether, the existence of the fishu in the Mog's home country is a very disquieting situation.

Test of Acquisition of Information—Lexical Substitutions (TAI-LS)

In this test, a key word governing the interpretation of a passage has been removed and consistently replaced by an artificial word. The passages, made up by the author, are written so as to provide a number of clues which make it possible to determine which of the options presented in the multiple choice items seems the more likely choice. Fine discriminations are often necessary, but always potentially possible on the basis of the available clues. The central point is that, since the basic concept (a verb or a noun) is left unidentified in the questions, the reader is forced to rely on information in the passage to a much greater degree than is usually the case. An example would be:

> Yesterday I saw a vurato. I was right on the spot when it happened. Cars slowed down so the drivers could get a better look. People are like that, I suppose. Whenever something out of the ordinary happens they've got to know what's going on. Why this inexplainable urge? I don't know. At any rate, a few seconds later I heard the sirens. The traffic came to a complete standstill. The street was entirely blocked by red emergency vehicles. There were also a few white cars. They belonged to the policemen directing the traffic. I waited till the end. It took about three hours to battle the vurato. Luckily enough the ambulance on the scene could be sent back empty.

Test of Acquisition of Information—Semantic Anomaly (TAI-SA).

In this test relationships among known events have been distorted drastically while syntactic relationships have been left undisturbed and "things" as such have not been knowingly relabeled. The relationships among these "things," however, have been changed completely. That is to say, while a twig must be still visualized as a twig, all of a sudden it can do things never though of as being in the sphere of activities of twigs before. For instance, in one of the TAI-SA stories, twigs grow scientists, and in another, waves push winds up. The important point is that the questions are asked in such a fashion and provide options in such a manner that a reader can figure out from the passage what the answer to the question should be, given enough ability on his part. That is, he is given the opportunity to demonstrate acquisition of information from reading the passage. Most of the original undistorted passages under the TAI-SA were obtained from Bormuth (1969). Examples are:

Story 1:

Waves push up winds on seas and lakes and ponds. Everyone who has seen a wave has seen a sea. Sometimes the winds are hardly noticeable. But the waves may push up winds as tall as a whale standing on his tail.

Story 2:

Trees want to grow new scientists to cut down the ones being replaced. Trees and numerous other plants also want to grow better scientists. So they make ways to find super scientists.

Tiny redwood scientists growing near the ground have been cut from twigs. Trees found that these twigs could grow quickly into new scientists. Instead of taking almost 40 years to grow to a beginning scientist the new scientists may take only 60 short years now.

It must be noted that the paragraphs above contain the original rationale for each of the tests. The extent to which the tests do indeed function as visualized is not incorporated in formulating these rationales.

STEP-40

Table 1

SUBJECTS USED IN FINAL TESTING STAGE

School	Grade	N	Mean IQ[a]	Mean Reading Score[b]
4	7	90	100.2	7.2
4	8	88	107.6	8.3
5	9	87	100.2	9.4

[a] Obtained from school system records. The IQ measure used is the California Test of Mental Maturity.

[b] Obtained from school system records. The reading score is the Total reading score from the SRA Achievement Series — Reading.

This test consisted of the first 40 items of the STEP reading test, form 3A.

PROCEDURE

After extensive revision, the final versions of the tests were administered to 265 7th, 8th, and 9th graders. (Table 1) Testing sessions lasted as long as needed. Actual testing time in most cases was 40-45 minutes, sometimes slightly shorter.

RESULTS

Descriptive Test Statistics

Table 2 shows means, standard deviations and reliability coefficients for the four tests computed for the entire sample of subjects in both passage conditions.

Table 2

DESCRIPTIVE STATISTICS FOR THE FOUR READING TESTS UNDER BOTH PASSAGE CONDITIONS

Test	Passage Condition	N	Mean (n = 40)	S.D.	KR-20
TAI-P	IN	127	21.77	7.81	.86
TAI-P	OUT	134	11.04	3.82	.07
TAI-LS	IN	127	23.06	7.78	.88
TAI-LS	OUT	134	12.70	3.32	.29
TAI-SA	IN	127	20.64	8.13	.88
TAI-SA	OUT	134	8.01	3.04	.38
STEP-40	IN	127	20.06	5.57	.75
STEP-40	OUT	134	13.66	3.53	.39

The TAI-P had a mean item difficulty of .54. The test seemed acceptably reliable with a difficulty level comparing favorably with that of the STEP-40.

The TAI-LS was somewhat less difficult, the mean item difficulty for this test was .58.

The TAI-SA, was rather reliable (KR-20 was .88) and not too difficult (mean item difficulty was .52).

The 40 STEP items, labelled as "STEP-40," formed the most difficult and the least reliable of the four reading tests.

In Table 3 the correlations among the four tests are shown. The values indicate a considerable amount of shared variance. A three component Principal Component solution, involving a number of factor markers revealed that all four tests loaded better than .80 on the first component. Further analyses indicated additional communality betwen TAI-P and the STEP-40 and between TAI-LS and TAI-SA respectively. (Compare Tuinman, 1970, for full details).

Table 3

Correlations Among The Four Reading Tests For The Passage-In Condition, Corrected For Attenuation. (N=120)[a]

Test	TAI-P (5)	TAI-LS (5)	TAI-SA (5)	STEP-40
TAI-P	—	.81	.80	.87
TAI-LS		—	.86	.83
TAI-SA			—	.80

[a] $p < .01$ for $r > .24$.

Tests of Hypotheses I and II

Hypotheses I and II are closely related. Both deal with the issue of the degree of control the reading passage has over the item-answering behavior of the test takers.

The basic question was: to what extent does a particular test-building strategy lead to success in terms of unguessable items? In other words, the results of the test-building were measured in a criterion referenced framework.

Hypothesis I was tested for the TAI-P, TAI-LS, TAI-SA and the STEP-40 separately. Table 4 presents the results of the four t-tests of the hypothesis: $H{:}u > k$ versus $A{:} < k$ where $k = 10$ as the chance expectation for a 40-item four-foil multiple choice test. The basic descriptive data of the four tests can be found in Table 2.

Table 4

Tests of the Hypothesis M: $u > k$, Where $k = 10$, For the Four Reading Tests Under The Passage Out Condition $(N = 134)$

Test	Mean	Standard Error	99% Upper Confidence Limit	t
TAI-P	11.04	.330	11.81	3.15
TAI-LS	12.70	.287	13.37	9.41
TAI-SA	8.01	.263	8.62	—7.56*
STEP-40	13.66	.305	14.37	12.00

* $p < .01$.

For the one-sided test of significance called for by hypothesis I a $t < -2.33$ lead to rejection of the null hypothesis at the .01 level of significance. Only the TAI-SA stood up to the strict requirement that the mean score be no higher than 10.0. The 99% upper confidence limit for each of the means is shown in Table 4 for further clarification.

Hypothesis II called for inference regarding the probability that a particular item had an item difficulty parameter not exceeding .25. This information provided, in the first place, additional insight into the degree to which the test construction criterion had been met. A higher-than-chance mean score for instance, could have been caused by a few very easy items or by many items with a true probability of being passed under the passage-out condition of just above .25. In the second place, a test of inference regarding these particular item parameters does seem important in connection with selections of subsamples of items for purposes of future research. It may be noted that in making decisions regarding the difficulty of items sample fluctuations have been taken into account consistently.

Table 5

NUMBER OF ITEMS IN THE FOUR READING TESTS WITH A PROBABILITY OF BEING PASSED UNDER THE PASSAGE-OUT CONDITION < .25

Test	TAI-P	TAI-LS	TAI-SA	STEP-40
	13	8	21	10

In Table 5 the number of items with a probability of being passed smaller than .25 under the passage-out condition is summarized for each test. An item was classified as such on the basis of a test of the hypothesis.

$$H: p > .25 \text{ vs. } A: p < .25$$

A 5% level of significance was set as the decision level.

As can be seen from Table 5, quite a few items were passable under the passage-out condition with a probability of success greater than chance. However, as is demonstrated by the mean score of the TAI-SA, the presence of such items is tolerable for practical purposes if the overriding requirement is formed by the fact that the mean test score should not exceed chance.

CONCLUSION

The three test development strategies employed in the development of the experimental tests seem not to have been equally successful. While the TAI-P and even the TAI-LS showed a reduction in the answerability under the passage-out condition as compared to the STEP-40, both of these tests remained answerable above chance level. This, however, was not the case for the TAI-SA test. Its format based on creating semantic anomaly, seems most promising.

DISCUSSION

At this point the question can be raised: Has this research resulted in a test which is ready for future use as a measure of acquisition of information from reading prose passages? A negative answer must be given. The TAI-SA is reliable and it possesses the desirable characteristic that the subject must read the passage in order to obtain a score which exceeds chance. Yet, this is not sufficient. A more ideal test would result in a mean score under the no-passage condition, not higher but also not lower than the score to be expected on the basis of chance.

Given the overall evaluation of the experimental tests in the previous paragraph, the question as to the relative effectiveness of the three different formats is still not completely answered.

One measure of efficiency in terms of reduction of above-chance answerability of items under the passage-out condition has been mentioned repeatedly: the mean scores for each of the tests. In terms of this measure, the TAI-SA was most efficient, with the TAI-P, TAI-LS, and the STEP-40 following. Weaver and Bickley (1967) quote a statistic which allows another look at the issue of reductive efficiency. According to them, the subjects who had no reading passage answered 67% as many items correctly as the subjects who did read the passage. From Table 2 it can be computed that this statistic equalled 51% for the TAI-P, 55% for the TAI-LS, 39% for the TAI-SA and 68% for the STEP-40. These data divulge two things. First of all, Weaver and Bickley's finding seems to be corroborated for normal reading tests and, secondly, it seems safe to conclude that in terms of the ratio items-answered-without-passage-to-items-answered-with-passage, all three experimental tests seemsd to function at a level above that of the regular reading test.

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PROBLEMS OF JUNIOR COLLEGE READING PROGRAMS

Several years ago in a lecture to college freshmen on the causes of reading disability, I mentioned immaturity as being one possible cause for reading failure. Afterward, a college freshman very seriously asked me, "How can I become mature right now?"

Perhaps the basic question for junior-community college reading programs is "How can we achieve instant maturity?" Two-year colleges are springing up all over America and have been referred to as the most dynamic, moving force of this decade. Junior college reading instructors are desperately grasping for the knowledge and capability to meet the varied demands for reading training in their communities. Junior college instructors have tried to solve their problems by reading literature appropriate for junior and senior high school teachers or university professors. If it is true that the junior college is truly a unique educational institution, is it possible that its reading problems are also unique?

The purpose of this paper is to discuss urgent problems identified by junior college teachers. In the spring of 1970, I spoke to reading instructors attending the Texas Junior College Teachers' Association conference. An informal survey was made of the 34 instructors in order to determine the major problems in establishing and implementing college reading programs. The problems listed by order of importance were: Motivation; Wide Range of Abilities; Time and Scheduling; Organization; Provision of Financial Support; Publicity; Qualified Personnel; and, Commercial Speed Reading Programs.

MOTIVATION

Lack of student motivation to improve reading skills is the primary problem. Lack of intrinsic motivation, poor class participation, outside reading and rote learning prove to be major difficulties. Many factors profoundly influence the effectiveness of reading improvement programs. One of the most difficult of these factors to deal with is motivation. Factors which motivate are likely to be highly subjective, personal experiences. If a person learns how to satisfy the needs of one phase of life, he is no longer very strongly motivated by them. Instead, he anticipates newer needs; thus his motives change. Motivation is not a particularly predictable process which is precisely why so many well-planned schemes for motivating individuals achieve such poor results.

WIDE RANGE OF ABILITIES

The second most important problem is the wide range of abilities within each class. In a junior college, with an open door admissions policy, one has every kind of student, from functional illiterates to excellent readers. The functional illiterate is defined here as one who has sat through twelve years of school and still cannot read. Former U.S. Commissioner of Education James E. Allen, Jr. stated that about half the unemployed youth, ages 16-21, are functionally illiterate (1969, p. 96). Junior college reading classes may have standardized reading test scores which range from ten to twenty reading levels. There are differences in general reading levels and also in proficiencies in different reading skills. Some students are low in speed, high in comprehension, and average in vocabulary and vice versa. In the more advanced skills of drawing conclusions, making inferences, reading critically or creatively, and reacting to reading, the range is tremendous.

There is a lack of good materials to meet wide ranges in ability. The quantity of materials is overwhelming, but most of it lacks quality; it is either too difficult or too easy and juvenile to excite or interest junior college students. Publishers tell us that copyrights for provocative materials are too expensive, but until these kinds of materials are implemented, students will not read. Daniel Boone and George Washington Carver are dull for today's turned-on generation.

There is also a dearth of good materials for foreign students. Either a basic approach is used, where one starts with good morning and good afternoon or programs jump to a higher level where a mastery of good English is almost essential and beyond the foreign student. Many time the foreign student, if he is a part of regular classes, wants to use the same materials as the others and cannot understand why he is treated differently. How can one find materials for Bolivians ,Japanese, Persians and Chinese which will fit their requirements for learning

English as a second language, yet not humiliate or embarrass these sensitive, eager young people?

TIME

The third problem is lack of sufficient time to adequately take care of individual reading problems. Classes generally are too large for the individualized teaching of such basic skills as phonic and structural analysis. Scheduling of time for these activities outside of class seems to be an impractical solution for college students enrolled in a full course of study.

ORGANIZATION

The fourth problem relates to the organization of reading programs for new junior colleges. With all the hullabaloo about such terminology as individualized programs, the tracking system, speed reading, and gadgetry, administrators and instructors alike are confused about how to establish the right program for meeting student needs. Sometimes administrators in new colleges buy expensive machines and other materials before a reading instructor is employed. Because of sensitive taxpayers and boards of regents, the reading instructor then has to use the materials, regardless of whether or not they fit the objectives of the program.

Any plans for a skills development program should be planned by the instructor himself, and should make provision for a systematic, coordinated, step-by-step kind of development. Such a program should be highly organized within a classroom situation.

Many researchers, however, advocate a total approach to reading, by integrating the best materials, methods, organization plans, and inservice education to produce a total learning efficiency unit. Many college reading experts agree that excellence in reading is not the result of installing a program, but rather that it is the product of a coordinated staff involvement. In a junior college, such involvement must include the interest of all faculty members as well as administrators.

PERSONNEL

The lack of qualified personnel is the fifth problem. In general, junior college reading teachers appear to have a limited perspective of what their responsibilities should be and seem involved in improvement of reading only within their scheduled classes. Some do not really understand the function and the role of a reading teacher, any more than do other faculty members or administrators.

Certainly, all reading teachers owe it to themselves, their community, and their profession to secure the best education possible, to employ the best methods available, and continually to seek new ways of improving their instruction. I believe everyone would agree that the instructor is the key to the whole operation. Successful teachers interact with their students, possess a sense of humor, and have a quality of resiliency and buoyancy. It helps to be a born diplomat, with a toughness that covers a gentle heart.

FINANCIAL SUPPORT

The sixth problem is the lack of adequate financial support for developing worthwhile programs. A few years ago this problem might have been rated number one. Now with all the financing from the federal government and the general agreement that reading levels are extremely low in this country, administrators and boards of regents have become better informed and seem to be more generous. Edgar Dale says that "as we think about developing reading systems we also face political questions. Tax money for language development competes with funds sought for highways, welfare, public housing, social security, and the like. Here evidence concerning the importance of reading in a society becomes signally strategic. It would be especially helpful if all legislators loved to read [1969, p. 211]." It would be helpful if all adiminstrators and members of boards of regents loved to read.

PUBLICITY

The lack of publicity is the seventh problem of the reading program in a community. Sometimes unenlightened administrators do not want to advertise a basic skills reading class because the public might infer that the institution is inferior. These same administrators might publicize a course in speed reading because of its popularity and the lack of stigma attached to this term. The instructor should take advantage of every speaking opportunity to enlighten the community about the advantages of a broad program with fundamental basic skill training as well as speed reading. If the program is highly successful, the former students are the best promoters of good publicity.

COMMERCIAL READING PROGRAMS

The last problem deals with commercial reading programs. Almost all of us find ourselves in competition with the Madison Avenue-type huckster who continuously praises and lauds the most wonderful system of reading ever developed and sells his product to an eager public.

Junior College reading programs differ from commercial programs in objectives, learning techniques, and methods of evaluation. Students, administrators, faculty members, and the community should be informed continually about these differences. If one can sell a dynamic program based on valid, modern educational theories to a public who desperately needs these services, then commercial reading programs should be no threat.

Perhaps problems in the junior college are not unique, but when we become specialists and innovators instead of general practitioners and cookbook artists, we will find unique answers to our problems.

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PROBLEMS OF INDIVIDUALIZATION

When we speak of problems peculiar to the teaching of reading in a community college, we are saying that the community college has teaching problems in reading exclusively its own and not shared with other types of collegiate institutions. This can be questioned. I believe that we have the same teaching problems in all institutions, but that in the community college we have a concentration of certain kinds of reading problems. This concentration stems from the open-door policy. We must recognize that high school grade point average is still the major criterion used for admitting high school graduates into four-year colleges. This is not necessarily true at the two-year college. At the community college students of all grade point averages are admitted.

THE NEED FOR INDIVIDUALIZATION

The admission policy may result in a fifteen year spread in the ability to read, yet all the students are in the freshman year in college. With this diversity we have a compounding of problems. Even with this diversity and compounding of problems many teachers handle the students on the basis that they are all the same. If teachers handle students on this basis, they do so because they are teaching grade level and not students. The vast differences in students dictate that there is a need to individualize reading instruction.

There is not complete agreement as to how to go about individualizing reading instruction at the college level. There is common agreement, however, that individualized instruction is personalized teaching which can be done in three ways. Help the student to read his college textbooks; here we are material centered and the reading levels of the student and text may be poorly matched. Help the student with his reading of special reading workbooks and manuals; again the student and materials may be poorly matched. Help the student in terms of his reading skill needs; here we are concerned with the goals of the student and not the material so there is a concerted effort to match the workbooks and material with a student's needs and reading level.

Whichever of the three plans is used, an individualized reading program means a break from traditional procedures that are class centered. Underlying individualized reading programs are a number of assumptions: learning begins where the student is; reading basically is an independent activity; students learn at different rates; students learn in different ways; students must attack individual reading deficiencies.

Recognizing That Students Are Different

From reading tests alone, we can make a start in recognizing differences. Total reading scores, for example, will show how students differ from one another. When we examine the subscores of a reading test we see how a student differs within himself. We know that a student's progress is usually not uniform in vocabulary, comprehension, and speed. An individual student may not have uniform growth in vocabulary within the content fields and literal reading versus critical reading. We have found that at Genesee Community College only a few of our students need help with the basic word attack skills as our problem is largely that of vocabulary, comprehension, and speed. Although other cognitive measures such as achievement and mental maturity tests are available, we have found that a most satisfactory individualized reading program can be developed on the basis of reading test measures alone.

Some community colleges are reporting the need to go beyond cognitive measures and explore the affective domain or the non-intellectual factors. For example, there is a need to assess student motivation. It is estimated that approximately one half of any improvement in reading stems from individual motivation or the desire to improve. There also is a need to explore student self-concepts and value positions. The St. Petersburg Junior College study reported by Clark and Ammans (1970) in the *Junior College Journal* is an excellent one. They found that one cannot predict from cognitive factors alone what students will do in reading. However, I believe the big problem in community college teaching today is to get teachers active in the use of standardized measurement in reading, with the goal that individualized student programs will follow. Later the important affective domain can be included. In addition to reading tests and other possible measures, each student should complete an intake sheet that will provide information about the reading interests, attitudes, habits that the student brings to the program, and what he hopes to get from his reading class.

DEVELOPING A PROGRAM FOR EACH STUDENT

At our college, we individualize first with vocabulary. To meet students on different levels, we use many vocabulary materials. Progress will be slow in vocabulary, and this will be reflected in posttesting. At times, the best evidence of vocabulary growth will come from the students themselves. They continually report to us that vocabulary work leads to improved comprehension. Students will profit most from the vocabulary exercises if the program involves both context clues and word elements.

Relative to comprehension, in Flint we use an array of comprehension materials. In all, about fifteen kinds of material are used, and these materials have continually been rated the most helpful by students. Students can be of much assistance in evaluating materials. For example, if a book is too easy or too difficult, students will look for a more difficult or less difficult book, depending on the situation. It is hard to set up a program emphasizing training in a particular comprehension skill without influencing the other comprehension skills as well. This, however, is not to be taken as something undesirable, but rather as the kind of training situation that is valuable. Raygor (1970) in his latest research points out that the differences between comprehension skills test scores are usually not reliable, in that the skill scores in comprehension are rather highly correlated. Similarly, DuBois (1969) demonstrated in his study the high relationship between comprehension skills in general reading and subject matter material. Training in general reading comprehension skills affected textbook comprehension skills and vice versa. We should not be too analytical in attempting to teach specific comprehension skills. In developing comprehension skills, it is most important that the materials be at a level which can be read with success and that the content be of high interest to the student.

Relative to rate of reading, we must talk about rate of understanding. This emphasis has significance in academic learning. To many, rate of reading does not connote rate of understanding. In promoting rate of understanding, we can expect more rapid progress if vocabulary and comprehension, on a scale, outstrip rate. It has been our experience that if vocabulary and comprehension, on a scale, are equal to rate, emphasizing speed may lead to a loss of comprehension. In working with rate, our most promising experimental area is that of reading flexibility. We have been most pleased with the few materials available today which train students to become versatile readers. We subject only above average readers to this experience.

EVALUATING THE PROGRESS OF EACH STUDENT

The success of any program can be ascertained from statistical evidence and subjective appraisal. Both approaches have their value and limitation. Post-testing will reveal to what extent the students have grown in the skills of reading. Some tests use confidence bands. When comparative bands do not overlap, the odds are great that a real difference in performance exists: the student, in all probability, has made genuine reading growth.

Student evaluations, properly conducted, can be of much assistance in determining the success of a reading program. A Free-style essay of self comment by the student, for example, can report reliably on changes of attitude, interest, and habits of approach. Find, if you can, to what extent student opinion correlates with objective measurement. At our college, we have found a positive relationship. Student evaluations are most insightful and profitable if they reflect success with students in the areas of motivation, concentration, study skills, help with other courses, and the enjoyment of reading.

The success of a reading program can also be determined by impact on grade point average. This impact, however, is difficult to ascertain. Four year colleges have continually reported research frustration in this area with respect to the many variables. But influence on grade point average should not be the ultimate factor in determining the success of a program. It must be recognized that in a community college many students will never matriculate beyond the freshman year. If we have improved their ability to read, a significant contribution was made.

In personalizing reading instruction at Genesee Community College, we have found it most helpful to take students into partnership. From this experience, we have learned directly from our consumers the ways in which we have both assisted and failed them. This has been the most valuable part of the evaluation process.

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MOTIVATION: BY WHOM? FOR WHAT?

Sprechen Sie Deutsch? Verstehen Sir? Wenn Sie es nicht verstehen, warum nicht?

Do you speak German? Do you understand? If you do not, why not?

There are many reasons why you should speak and read German fluently. A great amount of the world's worthwhile knowledge has been originally recorded in German. If you aspire to educational sophistication, it is practically a requisite that you attain a communicative knowledge of German.

With the motivation I have just given you for acquiring proficiency in the use of the German language, I trust that you will wait until I have finished this brief discourse before you madly rush out and enroll in the nearest beginning German course—if you have not already mastered its intricacies.

In reality, what inspiration or motivation, if any, have I given you to learn German? Unless you have a specific need to learn German, you probably would not even consider the formal study of the language.

The motivation which we attempt to inspire in many of our community college students is as ridiculous, if not more so, as the foregoing example.

This symposium is to deal with "Problems Peculiar to Teaching Reading Improvement in a Junior Community College". As a consequence, these remarks deal specifically with that segment of the community college population who would not be ordinarily admitted to a regular four-year institution because of grade point deficiency in the secondary schools. It is true that classes in reading are provided for the academically-sufficient student to enhance his proficiency and speed in reading. Motivation, per se, is not a problem with this student. Therefore, our concern is with the student who comes to the community college because it is the only place he can go for higher education. What is his motivation for continuing a course of action which thus far has proven to be futile insofar as success is concerned?

If the instructor is to provide the motivation for this student on some kind of logical basis, how should the instructor be trained? If we are to understand the student, to understand his reading problems, to understand what type of remedial process will best enhance his chance for success, to understand fully the processes of perception and cognition; we must have adequate training in the following: Anatomy and Physiology (particularly of the eye and brain); psychology (not just the introduction to); Elementary Reading; Diagnostic Testing and Interpretation; Remedial Techniques; a sociological background sufficient to help us understand the culturally deprived, the educationally handicapped, the disadvantaged, etc.

These areas should be among the minimum requirements for certification for teaching reading. Yet we know that very few states come anywhere near these requirements. Usually a degree in English is sufficient to make one an 'expert' in reading. As a consequence a great deal of in-service training must be done.

But the other problem that exists is even more critical than the lack of properly trained personnel: For what do we motivate these students? Here again we are confronted by many "ifs". If we can ascertain the student's potential, if we can determine rather accurately his socio-economic background, and if we can chart him on a course that will enable him to acquire the skills which he, up to this point, has not acquired, where will we aim him? What will provide him with the motivation to stick it out?

Riessman (1962) in *The Culturally Deprived Child*, gives an excellent portrait of the underprivileged which would be quite apt to describe the educationally handicapped student whom we have in the community colleges. The only truly relevant statement is, "The anti-intellectualism of the underprivileged individual is one of his most significant handicaps (p. 29)."

Piaget in *The Psychology of Intelligence* defines intelligence as ". . . Intelligence constitutes the state of equilibrium towards which tend all successive adaptations of a sensori-motor and cognitive nature, as well as all assimilatory and accommodatory interactions between the organism and the environment (1950, p. 11)."

Does an anomaly exist here? If Reissman is correct that the educationally handicapped is primarily interested in the real world with little or no value places on abstractions, are we correctly motivating such a student when we attempt to make him an academician? Likewise, if we accept Piaget's definition of intelligence, is not the capacity for abstraction necessary?

We could quite correctly infer that the greater the capacities for sensori-motor and cognitive assimilations, the greater the intelligence. If the underpriviliged operate primarily on a sensori-motor level, should not our motivation for that person be on that level?

The term relevance has been repeatedly heard these past years. Does education have relevance? How relevant is this or that course? For the remedial student the question should more aptly be stated as, Does this fit with my reality? The problem that is exant in our entire educational system is that reality for the teachers may be quite unlike reality for the educationally handicapped.

Burke in *Permanence and Change* states it nicely:

> But the question of motive brings us to the subject of communication, since motives are distinctly linguistic products. We discern situational patterns by means of the particular vocabulary of the cultural group into which we are born. Our minds, as linguistic products, are composed of concepts (verbally molded) which select certain relationships as meaningful. These relationships are not *realities,* they are *interpretations* of reality—hence different frameworks of interpretation will lead to different conclusions as to what reality is. (1965, p. 35)

What are the possible solutions to these two problems—lack of adequately trained personnel and lack of motivation on the part of the educationally handicapped student?

Teacher training could be the easiest to rectify. The teacher training institutions need to critically evaluate their programs in light of the preparedness of their graduates to enter this field. Reading groups, nationwide, should press for these badly needed changes.

The other problem is more all-encompassing. Dinkmeyer and Dreikurs in *Encouraging Children to Learn* state, "This question (of being able to guide students into becoming capable and responsible human beings) will be decided, in our opinion, by our ability to change from a punitive, retaliatory, and mistake-centered educational practice to one of encouragement for all those who have failed to find their way toward fulfillment (1963, pp. 124-125)."

This will require a complete change in our thinking about the educational system as a whole. Let's not start every Johnny and every Susie in the first grade with the concept that they are budding Ph.D.'s. Let's educate for reality. Let's motivate for reality. Let's be willing to admit that our systematized grade and academic discipline structure does not work for many students. Let's not continue in the community colleges to subject the failures to more of the same regimentation that has caused them to be failures. Let's find out what reality is for them and educate accordingly. Let's dispel the concept that to be a success you have to have a degree.

If we can have properly trained teachers and properly motivated students, I would not give a talk entitled "Motivation: By Whom?—For What?" but would rephrase it "Motivation: By Properly Trained Teachers—For Reality".

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ORAL AND ORAL-WRITTEN LANGUAGE MEASURES WITH FIRST GRADE PUPILS[1]

The extent to which success in learning to read is dependent upon oral language abilities long has intrigued researchers and teachers. Many reading specialists and first grade instructors believe that a child's success in learning to read actually is dependent upon his possession of "adequate" oral language. One illustration should suffice. "Proficiency in oral communication, therefore is the foundation upon which competency in reading is built [Lord, Van Deman, and Miles, 1965, p. 5]." Such proponents argue that the normal process by which language should be mastered is by following a sequence of listening, speaking, reading, and finally writing. Reading thus is regarded as a direct extension of oral language and one important measure of the child's readiness to read is his ability to listen and to speak. Beliefs of this sort apparently are behind recent efforts to teach English as a second language to culturally disadvantaged children and members of ethnic groups.

Despite such contentions little empirical evidence has been proffered to support these widely held beliefs. Exactly what adequate language is has not been delineated, nor have reliable and valid tests been developed. Furthermore little evidence is available to indicate that language is mastered more efficiently or that reading is learned more effectively in a hierarchial fashion, *viz:* listening, speaking, reading, and writing. The fact that most present day adults who have studied foreign languages tend to be able to read the second language somewhat better than they can understand it aurally or speak it tends to contradict the belief that this sequence is either necessary or even desirable. In fact, it seems unlikely that even when learning one's native language this sequential pattern is followed. The fact that language ability is correlated positively with mental ability, socioeconomic status, sex, and similar attributes which help a child to succeed in school, may have led teachers to overgeneralize its importance to beginning reading.

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[1] The writers wish to acknowledge the assistance of A. C. Bickley and J. L. Doak in conducting the research on which this paper is based.

Recent interest in the opinions of linguists and in the scientific study of language also has raised questions about the relationships between oral and written language. Bloomfield (1942), one of the earliest linguists to discuss reading, stressed that the reading act consists of transforming written symbols into sounds. Soffietti (1955), Fries (1963), Lefevre (1964), and Carroll (1964) also have presented the linguist's view that reading requires the decoding of printed symbols and transforming them to subvocal speech sounds. Fries (1963) even states that "The process of learning to read in one's native language is *the process of transfer* from auditory signs for language signals which the child has already learned to the new visual signs for the same signals [p. 119]."

When an adult looks back and tries to recall how he learned his oral-written language, the impression that both oral and written were identical processes seems to be overwhelming. However careful analysis of the learning tasks faced by children reveals considerable differences in the conditions imposed by oral and written language. In learning natural language of the oral type the child functions in a real life situation. Language learning is a must. A child's speech emissions are reinforced spontaneously. His models speak and he speaks. He does not learn rules; he behaves according to rules (i.e. predictable patterns). He learns continuously over many years in a myriad of circumstances. His lessons are not intensive and compressed as they are in learning to read.

Language also is related to cognitive development. Piaget (1969) and Vygotsky (1962) seem to feel that although language is necessary for high level reasoning, language and conceptualization are not identical, but rather represent separate functional systems. It seems likely that some types of concepts are developed without language playing an essential role. Similarly there do not seem to be compelling reasons to assume that children need well developed oral language in order to conceptualize certain verbal units. It seems more probable that for the beginning reader the transfer of meaning from oral to graphic representation of language is less simple and direct than commonly assumed. Certainly at higher age levels for more skillful readers the transformation between oral and written and written to oral language is not simple and straight forward. A major difficulty in studying the relationship between oral and written language proficiency lies in the lack of reliable psychometric instruments. What are the criteria to be employed in judging language capabilities? How do we weigh structure, vocabulary, intonation, pitch, stress, prounuciation, etc? Should language be stimulated by the use of specific stimuli or should language be comparatively free and unprovoked? The lack of common agreement concerning performance criteria is one reason for a dearth of reliable and valid measure. Reading specialists however often suggest that such abilities as auditory perception of sounds, ability to pronounce words, extent of vocabulary, and sentence structure and length of sentences spoken be observed and noted in assessing the child's "readiness" for reading instruction. Standardized readiness tests however fail to appraise the child's oral language abilities, but rather concentrate on more restricted tasks such as discrimination, memory, etc.

The measurement of the language of naive readers (1st Graders) further is complicated by the pupils lack of maturity, inconsistent behavior, and by unfamiliarity with testing procedures. Unless considerable time is spent establishing rapport, providing warm-up sessions, assuring that the nature of the tasks to be performed is understood, encouraging the unsure and monitoring the disinterested, the results attained are likely to be highly unreliable and invalid. Most researchers who have interviewed and examined children of kindergarten and first grade age have numerous stories to relate concerning pupils who they badly misjudged, or misunderstood.

For several years the authors have been studying the problem of obtaining adequate language measures from beginning readers. Our underlying assumption has been that oral language dimensions are analyzable into discriminable parts—that grammar or syntax for example, is in measurable ways different from vocabulary. The same assumption was made about reading, namely, that the reading act or reading behavior is analyzable into a set of discriminable components. Following the hypothesis of many linguists it is further assumed that oral language and reading language share major components, so that oral language grammar is highly related to reading language grammar and oral language vocabulary is highly related to reading language vocabulary.

From a number of initial attempts at measurement, four types of instruments were decided upon for further study. The first was an oral cloze measure developed to measure the child's knowledge of standard English language structure. Written cloze measures have been widely used in reading and psycholinguistic research. Cloze results have been shown to correlate positively with reading ability, language capabilitiy and intelligence. Kingston and Weaver (1970) have demonstrated that it is feasible to employ cloze techniques with culturally disadvantaged beginning readers. A second cloze test also was designed to test the child's knowledge and use of lexical as contrasted to structural words. Each of these tests consisted of presenting sentences to the children first intact, and then with one or more words of a particular type deleted. The structural and lexical dichotomy was adopted from Fries (1957) who spoke of structural and lexical meanings in English. According to Fries structural meaning is carried chiefly by function words i.e. words which are not nouns, main verbs, adjectives, or adverbs. Other linguists sometimes use the terms grammatical meaning and syntactical meaning. In contrast is structural meanings, Fries employed the term lexical meaning to describe meanings carried mainly by nouns, adjectives, main verbs, and adverbs. Other linguists have used the terms semantic meaning, content word meaning, or non-grammatical meaning for this construct. In both tests children were requested to supply the proper word for the missing one. Extreme care was taken to assure that each child understood the nature of the task presented and certain warm-up or practice sentences were provided. Sample items from the lexical cloze measure follow:

1. My sister has a *diamond* ring.
2. A *microscope* makes little things look big.
3. The *hero* caught the bank robber.

Sample items from the structural cloze measures are:

1. The girl lost *a* glove.
2. It *is* cold today.
3. John *and* Joe are at school.

A third test was designed to assess a characteristic often described by child psychologists and elementary teachers: the child's ability to reason intelligently on an abstract-concrete continuum. Piaget, Vygotsky, and others often have postulated that children's thinking tends to move from concrete to abstract as the child matures. Psychiatrists also have observed that certain types of brain damage and psychopathology seems to cause regressive patterns in adults from abstract to more concrete patterns of thought. Coleman (1966) experimenting with college students had employed the concept, abstract, in a more precise manner . To Coleman, a concrete word was one with a perceivable referent. (Coleman seems to have ignored the fact that a class referent in itself is abstract. Thus, for Coleman, boy is concrete, so is mother. Home and play are abstract.) In developing this test it was planned originally to follow Coleman's definition as nearly as possible. Experience, however, showed that deleting abstract terms in cloze measures required more context than was feasible for the first grader to handle. As analogies have been successfully employed for more than fifty years, to measure reasoning ability, it was decided to modify such tasks by making them cloze measures. This is, analogic pairs taken from the WIPPSC (Wechsier, 1967) were placed in the context of sentences with one member of the pair deleted so as to form a cloze task. Typical sentences were:

1. Brother is a boy; sister is a *girl*.
2. A bird flies; a fish *swims*.
3. Fire is hot; ice is *cold*.

All three measures were administered orally in individual, private sessions to 102 first graders in a North Georgia rural elementary school. All tests were administered within a three week period during the first month of the child's enrollment in first grade. These measures represent Method One (Oral Method) in a Campbell-Fiske (1959) Construct Discriminant Validity Model. These data will be presented elsewhere.

Instruments developed for Method Two, the Oral-Written Method, were designed to parallel the tests devoloped for Method One. Test one was a structural cloze test, test two, a lexical cloze test, and test three, an analogies task. The major differences between these measures and those employed in Method One was that the children listened to sentences on a tape recorder while reading the sentences. The child's task was to circle the word that went in the blank.

The analogies test was similar to that used in Method One except that the examiner read the statement while the child read the statement silently and selected the proper word from three presented. Examples are:

1. A man is big; a child is _______.
    large
    long
    small
2. Women are mothers; men are _______.
    fathers
    sisters
    aunts

These three types of measures were administered in February and March to groups consisting of four or five children each.

Method Three consisted of a standardized reading test, a test of grammar, and a multiple-choice analogies test. Subtest VI titled Phonetic Analysis and Subtest VII, Structural Analysis of the Basal Reader Test were used as the structural measures and five subtests, I Sentence Meaning, II Sensory Images, III Emotional Reactions, IV Perceiving Relationships, and V Scrutiny-Control were combined and employed as a lexical measure. A specially developed multiple-choice test of analogies was employed as the measure of abstraction. Typical of the items are the following:

1. Boys grow up to be men and girls to be _______.
    sisters
    women

2. Schools have books; garages have ______.
   cars
   movies

These tests were administered in May just prior to the end of the school year.

There was very little evidence, using the Campbell-Fiske criteria, of discriminable constructs. The major separation was between the oral method of test presentation and the two presentations of the low reliability of the oral tests.

Our experiences have shown that certain procedures in obtaining measures on young children should be adhered to if satisfactory results are to be obtained.

1) Children should know the examiner well in non-test situations.
2) Testing at any one session should be short—10-15 items 15 to 20 minutes total testing time.
3) Children who show test anxiety should be released immediately and tried again another day.
4) Test length for adequate reliability should be obtained by summing over two or more short testing sessions.
5) Instructions for the test should be in the form of examples of the task to be performed. Several examples should be given.
6) Immediate reinforcement is not essential, but a small reward given at the end of a testing session provided eagerness to return for more.
7) Difficulty on cloze tests should be increased first by increasing context, e.g. two sentences, 1 word deletion. The next difficult step is increasing number of deletions.
8) First graders, in general, are not able to complete n*th* word cloze tasks.

Few research reports devote sufficient time to a discussion of the trials and errors of working with children in a school situation. Schools of course are organized for instruction, not research. Research teams are required to demonstrate the diplomatic skill of senior ambassadors if they are to succeed in collecting data without outliving their welcome. This means that researchers must be flexible in their schedules, willing to be displaced from their assigned places, and able to take on additional duties when requested by teachers and the principal. Teachers often have only meager or perhaps even erroneous information concerning the activities of a university team. If they are insecure or suspicious, they may have a negative effect on the responses made by pupils. They can even discourage children in a number of subtle or even unsubtle ways. In our study teachers were informed at all steps of the nature of the project. A teacher appreciation day was held the last month of school in which cookies, coffee, ice cream, and cokes were furnished by the research team. The teachers were thanked properly for their assistance and cooperation. In the beginning of the school year all first grade teachers met with the research team to agree on rules of the game or procedure. Close cooperative relations were maintained throughout the year and teachers were made to feel they were an important part of the project. Continuous liaison is necessary, however, in order to collect reliable and valid data. In the study reported it had been decided that pupils who mastered the tasks would be reinforced with plastic tokens. Our psychometrists however could not stand the pain and disappointment of those who failed the tests. After a rapid consultation it was decided to reinforce all children. This was a good decision because each child became highly motivated and eager to master the presented tests. The difference in motivation may be a major factor in the success our subjects had in mastering complex tasks. All our subjects were actually involved in the tasks presented to them. Similarly the close rapport developed by expert psychometrists insured maximum pupil involvement. One can only wonder how many studies of first grade children are invalid because the teachers and pupils were given tests without really knowing who is administering them or why they are being administered, or what's in it for everyone. In our opinion, it is necessary for researchers to be able to show that their subjects were eagerly and actively involved. Our research team also discovered that children must be carefully monitored if optimal results are to be obtained. Individual measures were employed for all oral tests. The written measures involved only three to five children. All subjects were given sufficient training so that they understood thoroughly the nature of the tasks they were given. Rest periods were provided whenever a child seemed to tire or lag in interest. Finally, although the women's liberation movement may take exception, we though the fact that our research team consisted of males was an advantage. All our psychometrists were vigorous young masculine types. In our elementary school where all primary grade teachers were female, the boys seemed to welcome the chance of working with men. Perhaps they did not see these able young men as teachers and hence were more able to enter into the "game-like" activities.

Our experiences have convinced us that first graders are able to perform successfully with oral and written cloze measures. Care must be taken to ensure that the children actively become involved in the tasks. The research activities, furthermore, must be conducted in an environment where the research team is present so often that children and teachers regard the research activity as a normal part of the school function.

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SOME LINGUISTIC DIMENSIONS IN AUDITORY BLENDNG

This experiment[1] compared six approaches to training preschool children in eight types of blends. Previous experiments (Laumbach, 1968, Coleman, 1970) gave information as to the linguistic dimensions of blending words. These studies indicated that words can be blended more easily when broken between the vowel and the consonant (VC) than when broken between the consonant and the vowel (CV). It was observed in initial training sessions of the Laumbach and Coleman studies that from the start nearly all children could blend four-syllable words such as *macaroni* (SS/SS) and most could blend two-syllable words such as *baby* (S/S). Yet few could blend most two-phoneme words (P/P). It was reasoned therefore that among the one-syllable words, those which have two phonemes on either side of the break (PP/PP) would be easier to blend than those consisting of only one phoneme on either side (P/P). The purpose of this experiment was twofold. It sought the effects of these linguistic dimensions in blending performance and it sought the effects of these linguistic dimensions in blending training.

PROCEDURES

Subjects

The 120 subjects were preschool children aged 56 to 80 months. Approximately the same number of boys and girls were tested in each group. The children tested represented a cross-section of local pre-

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schools and included 36 children from a preschool at Ft. Bliss which represented a cross-section of the country and of socioeconomic class.

Stimuli

Each child was asked to blend 24 different words on each of four testing days and to take a final test on a fifth day of 32 words. The words were drawn largely from Rinsland's (1945) list of most frequently used words for first graders. Additional words and a nonsense syllable were added to effectuate a balance in word categories.

The words were arranged into three groups according to presentation orders for each the VC and CV list as shown in Table 1. The presentation order, then, for Groups 1 and 4 was easy to hard; for Groups 2 and 5, hard to easy; and for Groups 3 and 6, mixed. The words for a given day and a given group were randomized separately into four word orders. These orders were given to equal numbers of the 20 subjects in each group.

Table 1

Presentation Orders of Treatments

Groups	List	Order	Day 1	Day 2	Day 3	Day 4
1	CV	E-H	SS/SS	S/S	PP/PP	P/P
2	CV	H-E	P/P	PP/PP	S/S	SS/SS
3	CV	A random mix across all days				
4	VC	E-H	SS/SS	S/S	PP/PP	P/P
5	VC	H-E	P/P	PP/PP	S/S	SS/SS
6	VC	A random mix across all days				

The final day of testing was the same for all subjects and included four words belonging to each of the eight categories: VC–SS/SS, VC–S/S, VC–PP/PP, VC–P/P, CV–SS/SS, CV–S/S, CV–PP/PP, and CV-P/P. The list was arranged in 20 different random orders, one for each subject within each treatment group.

The words themselves were balanced in such a way that the proportion of the phoneme types was constant across the eight blending groups.

Presentation

Six experimenters conducted this experiment, and with few exceptions, each experimenter tested an equal number of children in each of the six groups. Circumstances made it necessary for much of Group 6 to be distributed between two of the experimenters.

Individual testing was conducted in five 10-minute sessions. The four stimulus lists for a child were given as much as possible on consecutive days, or on four days in a five-day school week. The fifth session was final testing and was given as much as possible on the Monday following the other sessions. Where absences made it necessary to deviate from this basic format, two days were always allowed to intervene between the fourth session and final testing.

Testing was done in rooms apart from the classrooms. Disruptive noises and stimuli were kept at a minimum. The subject and experimenter generally sat opposite one another at a table. The experimenter began by giving the following instructions: "We are going to play a game with words. Every time you give me a right answer, I will put a chip in this cup, and when you get all these chips (8) in the cup, you'll get a prize. I am going to say two little words (or sounds) to you, and I want you to put them together to make one big word. I'll do one for practice so you'll see what I mean: I say RAIN–BOW, and you would say back to me RAINBOW. Now you may put these sounds together even if you don't know the sounds and the words." The experimenter then proceeded with the task, saying each word in order and allowing about one second between the first and second parts of each word. Each time the child blended correctly, the experimenter complimented him and the child put a chip in the cup. When the child had accumulated eight chips in the cup, he chose a prize from the bag of small toys. Then, the procedure was repeated until all the words for the day were completed. Any chips left in the cup at the end of a day's session were used as a headstart for the next session. When a child gave an incorrect answer, the experimenter recorded the response and instructed the child in the correct answer. When a child was doing very poorly, the experimenter gave the child an opportunity for a success by asking a multiple choice question on a word he missed, e.g., for "SHE", he would ask, "Should you have said 'SH' or 'SHE' or 'E'?" If the child then responded correctly, he put a chip in the cup, but the experimenter scored the response as incorrect. By repeating this procedure as often as necessary each child won at least one prize in each day of testing. On the fifth day of testing, the final test was given and neither were chips used nor feedback given the child as to whether his answers were correct or incorrect. The child was allowed to choose a prize at the end of the session. The experimenter explained the procedural variation at the onset.

RESULTS

The data were analyzed in terms of number of words blended correctly for each of the eight stimulus groups of four items each. Thus, for each subject there was a maximum score of four for each stimulus set, a minimum score of zero. The results of the analysis of variance performed on the scores are summarized in Table 2.

Table 2
Summary of Analysis of Variance for Blending after Training

SOURCE	df	MS	F
Between *Ss*	119		
List for training (L)	1	18.70	2.26
Order of presentation for stimulus types (O)	2	14.65	1.77
L x O	2	7.25	.88
error$_1$	114	8.28	
Within *Ss*	840		
Type of break for test item (T)	1	47.70	54.08**
L x T	1	14.02	15.89**
O x T	2	.68	.77
L x O x T	2	2.93	3.32*
error$_2$	114	.88	
Unit between which break is made for test item (U)	1	129.07	104.72**
L x U	1	.34	.27
O x U	2	8.88	7.20**
L x O x U	2	6.41	5.20**
error$_3$	114	1.23	
Size of units to be blended in test (S)	1	.06	.08
L x S	1	1.50	2.03
O x S	2	1.21	1.64
L x O x S	2	.28	.38
error$_4$	114	.74	
T x U	1	16.54	23.81**
L x T x U	1	2.02	2.91
O x T x U	2	.46	.67
L x O x T x U	2	.43	.62
error$_5$	114	.69	
T x S	1	.94	1.63
L x T x S	1	.27	.47
O x T x S	2	.09	.15
L x O x T x S	2	.63	1.10
error$_6$	114	.57	
U x S	1	13.07	16.58**
L x U x S	1	1.20	1.53
O x U x S	2	.03	.04
L x O x U x S	2	.40	.51
error$_7$	114	.79	
T x U x S	1	4.54	8.52**
L x T x U x S	1	.60	1.13
O x T x U x S	2	.26	.49
L x O x T x U x S	2	.31	.59
error$_8$	114	.53	

$^{*}p < .05$
$^{**}p < .01$

$\text{error}_1 = Ss + SsxL + SsxO + SsxLxO$
$\text{error}_2 = SsxT + SsxLxT + SsxOxT + SsxLxOxT$
$\text{error}_3 = SsxU + SsxLxU + SsxOxU + SsxLxOxU$
$\text{error}_4 = SsxS + SsxLxS + SsxOxS + SsxLxOxS$
$\text{error}_5 = SsxTxU + SsxLxTxU + SsxOxTxU + SsxLxOxTxU$
$\text{error}_6 = SsxTxSx + SsxLxTxS + SsxOxTxSx + SsxLxOxTxS$
$\text{error}^7 = SsxUxS + SsxLxUxS + SsxOxUxS + SsxLxOxUxS$
$\text{error}^8 = SsxTxUxS + SsxLxTxUxS + SsxOxTxUxS + SsxLxOxTxUxS$

The main effects of Type of test item break, CV-VC, and linguistic Unit between which there was a break, Syllable-Phoneme, were significant. Those main effects for the Size of units to be blended, Single or Double syllable or phoneme, training List of CV or VC training items, and Order of presentation for stimulus types were not significant. Of the first order interactions training List x Type of test item break, Order of presentation x Unit blended, and Type of test item

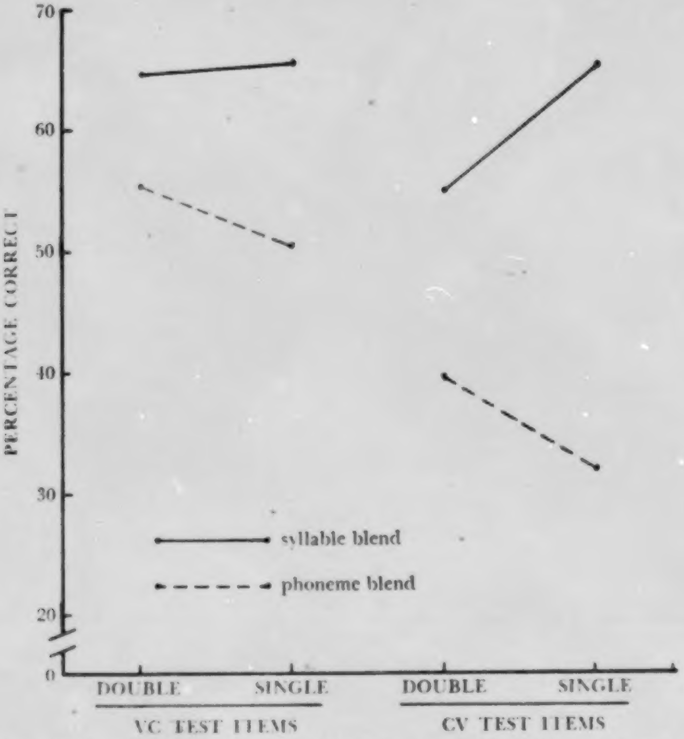

Fig. 1 Percent blended correctly as a function of unit blended, type of test item, and size of units blended (T x U x S).

break x Unit blended were significant. Significant second order interactions were List x Order x Type of test item break, List x Order x Unit blended, and Type of test item break x Unit blended x Size of unit blended. The remaining first and higher order interactions were not significant sources of variance. Summaries of the significant effects are presented in Fig. 1, 2, and 3.

Figure 1 presents percent blended correctly as a function of unit blended, type of test item, and size of units blended (T x U x S). Inspection of this figure suggests that the difference in performance on syllable blends and phoneme blends was greater for CV type items

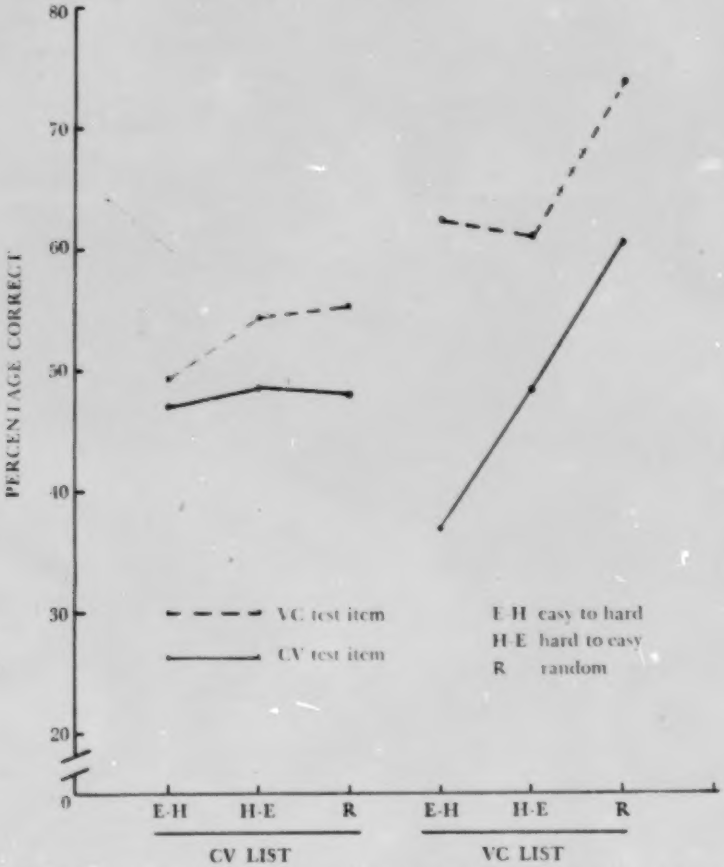

Fig. 2 Percent blended correctly as a function of test item type, training list, and presentation order (L x O x T)

than VC type test items. Furthermore, for the CV type test items the difference in performance on the syllable blends and phoneme blends was greater for single units. Therefore, the greatest difference occurs between CV type and S/S and P/P words, the least difference between VC type SS/SS and PP/PP words.

The significant interaction of type of test item break and unit blended (T x U) can be inferred from Figure 1. While percentage of syllables blended was only 4.6% lower for CV test items than those for VC test items, the percentage for phonemes was 17.7% lower.

The significant main effects of unit blended (U) and type of test item break (T) may also be inferred from Figure 1. The percentage blended correctly was 62.7% for syllable blends, 44.4% for phoneme blends. Percentage blended correctly was 48.0% for CV words, 59.1% for VC words.

Figure 2 presents percent blended correctly as a function of test item type, training list, and presentation order (L x O x T). Examination of the figure reveals that percent VC test items blended correctly increases as one proceeds from easy-hard order to hard-easy on to random order for both training lists CV and VC. However, the percent of CV test items blended correctly does not vary across order for the CV training list; it increases across the levels of order for the VC training list.

The significant training list by type of test item break (L x T) may be inferred from Figure 2. Collapsing across order the percent correct for VC test items is essentially the same for CV and VC training, 47.5% and 48.4% respectively, while the percent of correct responses to VC test items after VC training, 65.6%, is 17.0% greater than that for VC test items after CV training, 52.6%.

Figure 3 presents percent blended correctly as a function of unit blended, training list, and presentation order (L x O x U). The figure shows a recency effect for the easy-hard and hard-easy training orders for both CV and VC training lists. For the hard-easy groups where syllable blends were presented on the last day before the test (see Table 1), the scores were relatively high for syllable blend test items, low for phoneme blend test items; when the phoneme blends were presented on the last day before the test, the phoneme blend scores were high, the syllable blend scores low. After random order CV training the number of correct syllable blends was lower than either other order; after random order VC training the number of correct blends was even higher. The phoneme blend scores were substantially higher after both random order trainings than after any of the easy-hard order trainings.

The significant interaction of training order presentation and unit blended (O x U) can be inferred from Figure 3 as well. The same pattern held as in the higher order interaction. Collapsing across lists

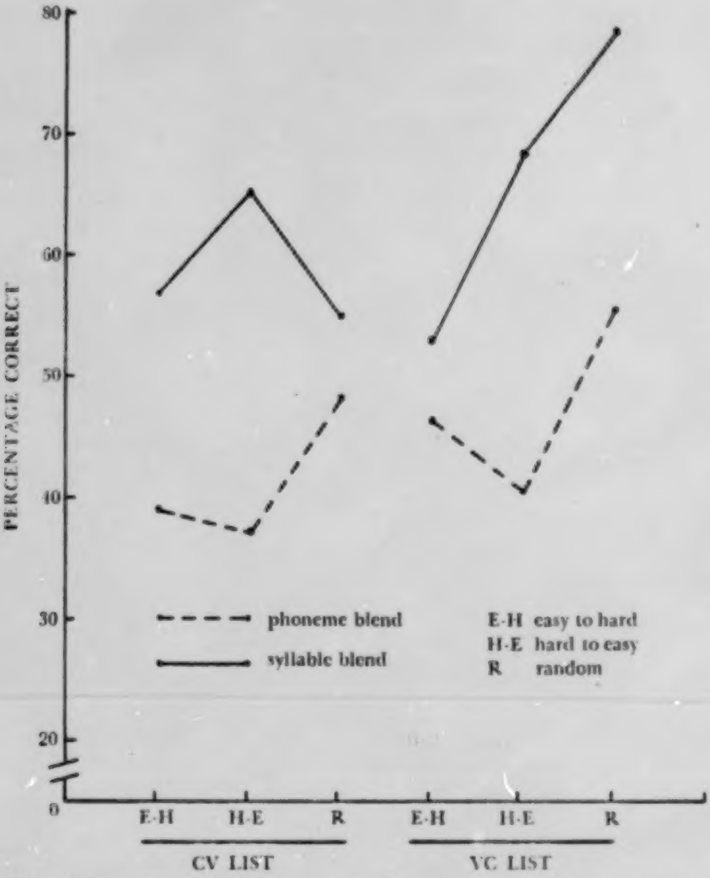

Fig. 3 Percent blended correctly as a function of unit blended, training list, and presentation order (L x O x U).

the mean percent correct for syllable blends after random order training was about the same as for hard-easy training.

Discussion

The results of linguistic dimensions on blending performance were generally as expected. Syllables were easier to blend than phonemes. The findings of previous studies of two-phoneme blending (P/P) that VC blends were easier than CV blends have been resubstantiated. In addition, these results can be extended to double phoneme blends (PP/PP). The effect of the CV break type on syllable blending would seem to occur only for the double syllable CV blends (CV: SS/SS).

The increase of length in phoneme blends (P/P to PP/PP) corresponded to a higher number of correct blends, thus reinforcing the earlier contention that greater length of the parts to be blended would *contribute to the recognizability* of the whole blending word. The single syllable (S) as a unit consisted of several phonemes and as such was even greater in size than the double phoneme unit (PP). Single syllable blends were also easier than the double phoneme blends. The double syllable (SS) was still greater in size but it was not observed to be easier. It is suggested that the potentially greater recognizability of these longer units was offset by the childrens' lack of familiarity with many four syllable words and the subsequent difficulty of holding them in memory for a correct response.

Neither the linguistic dimension CV-VC break training list, the orders of the groups representing the three other linguistic dimensions, nor any combination thereof had any significant effect on the overall blending score for the test. VC training resulted in slightly higher overall test scores; furthermore random order training seemed to result in slightly higher final test scores. Correspondingly the highest final test scores occurred after random order VC list training.

CV training resulted in similar scores for CV and VC test items; VC training resulted in considerably high VC test item scores and the same CV item scores. Thus, VC training seemed better for teaching VC blends, it was no worse than CV training for teaching CV blends.

The linguistic units blended (S or P) on the last day before the test increased the scores of the corresponding items on the test and decreased that of the others. For the hard-easy groups where syllable blends were presented on the last day before the test, the scores were relatively high for syllable blend test items, low for phoneme blend test items; when the phoneme blends were presented on the last day before the test, the phoneme blend scores were high, the syllable blend scores low. That is, training for one did not transfer well to performance of the other.

After random order CV training, the number of correct syllable blends was [illegible] than either other order; after random order VC training the number of correct blends was even higher. The phoneme blend scores were substantially higher after both random order trainings than after any of the easy-hard or hard easy order trainings. Thus, the mixed training on the low transfer types seemed to generalize better to the mixed presentation in the final test.

Apparently phoneme and syllable blending involved different linguistic blending concepts and therefore different blending tasks. The subject was not only required to perform a task; he was also required to determine which task to perform. Optimal training could probably be achieved by training from easy to hard within one concept area. However, if training is to optimize performance in a combination of concept areas such as syllable and phoneme blending as presented in the final test of this study, the training of the two would probably have to be interspersed. Future studies will focus on order, optimal numbers of presentations, and interspersal as a function of these and other linguistic blending concepts.

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WHAT GUIDANCE COULD BE OFFERED TO THE STUDENT ALIENATED FROM THE FOREIGN LANGUAGE EXPERIENCE?

This spring the University of California abolished the Foreign Language requirement as a part of its general education curriculum. In recent years we have observed the status of foreign languages in the college curriculum becoming more and more uncertain, foreign language majors facing increasingly dim future prospects, and students generally showing a marked lack of motivation for learning a foreign language.

The prevalent attitude that students have toward foreign language learning represents both a puzzling and incongruous phenomenon in a society which prides itself on its ethnic, linguistic, and cultural plurality, particularly at the time when it is developing closer and wide cooperation with the rest of the modern world.

The background of second language learning is so broad that it may be viewed in a variety of perspectives, ranging from subtle symptoms of an isolationist tendency on the national scale to rather technical analyses of linguistic, psycholinguistic, psychological, and pedagogical nature. In the face of all the intelligence that such investigations could offer us we are in dire need of something beyond, or rather beneath the generalities of conflicting theoretical considerations—if we are to fulfill our role of student counselors. In the first place we need to acquire an understanding of typical difficulties encountered in foreign language learning, and also to develop an insight into the assumptions of the method of instruction employed, to be in the position to offer specific recommendations of procedures and techniques which may be helpful to the student. Accordingly, this paper will be concerned with those aspects of the dominant method of instruction which can be more directly associated with the resulting problems both in learning and motivation. Also, we will suggest some directions for the use of the counselor who must deal with the substance of the unresolved theoretical issues in the pragmatic terms of what can be done here and how to help the student adjust to course demands.

DEFINITION OF FOREIGN LANGUAGE SYNDROME

We start from the assumption that there is a foreign language syndrome on our college campuses. This malady is typically reflected in the patient's frustration with and consequent alienation from the foreign language experience in spite of his possible acceptance of other products and manifestations of the foreign culture itself. If we are to suggest isolationism as a possible cause for this attitude, we must be able to relate this tendency to the alienation of students from foreign languages. However, today's young generations seem to have a romantic affinity for the unusual, the different, the exotic, and, if I may add, for the "way out" things. Whatever this may mean it certainly must be far removed from the tendency to close in and isolate oneself from the world. Nevertheless, these same young people seem to find their exposure to foreign languages to be singularly deficient when compared to the human interest, more complete involvement, and relevance to their lives that they have been able to find in foreign cultures in other ways.

Obviously, the alienation has grown out of their experience with the study of some foreign language. It is our contention that the nature of this experience is only indirectly related to the particular language—but directly associated with the method and content of instruction.

OUTLINE OF THE AUDIO-LINGUAL METHOD

For a number of years the Audio-Lingual (A-L) method has dominated the classroom at the initial and motivationally crucial stage in second language learning. Therefore, it is in order that some answers are sought to explain the factors which have contributed to such a widespread disenchantment with the foreign language experience.

At the base of the A-L approach are found principles of Skinner's vesrion of behaviorism extended to language (1957), combined with linguistic structures, as the content of the target language. Briefly, the part played by linguistics in the A-L approach has been restricted to furnishing material which the contrastive analysis has been able to isolate and recommend as being representative structural patterns of that particular language. Skinner proposed that language is a behavior acquired through operant conditioning and, although this theory seems to be rather questionable (Chomsky, 1959), it offered a simple model of the learning mechanism to the practical minded linguists. They felt that the entire process of language learning can be reduced to systematic "internalization" of linguistic structures, by means of operant conditioning and that the structures were to serve as "patterns" for generation of corresponding utterances. Spolsky (1966) summarizes the four major assumptions of the A-L method as follows: Foreign language learning is a mechanical process of habit formation; habits are strengthened by reinforcement; language is behavior made up of habit sequences at the phonemic, morphological, lexical, and syntactic levels; and, Repetition, practice, and reinforcement of units and their concatenation are effective ways of developing language performance.

It is immediately apparent that if the initial hypothesis were accepted as correct, namely that verbal behavior is made up of habit sequences only and that language learning is a mechanical process, then it would only take efficiently manipulated mechanical devices in order to accomplish the task of mastery of a foreign language. Accordingly, memorization of dialogues remains the major activity both in classroom and language laboratory, and structure drill represents the principal learning device of the method, since it mirrors rather closely the formula of stimulus and response. In order to promote internalization of grammatical principles the A-L theoreticians rely heavily on the process of discovery. Although we realize that discovery can be of considerable value to advanced students, we find that its potential at the initial stages of acquisition of grammatical competence is questionable both because of its excessive demands on classroom time, and because of its frequently frustrating and demoralizing effect on students. It is sufficient to examine a book designed to bring about such a discovery in order to realize how limited is the scope of the potentially deducible grammatical principle, and how little help it offers to the student who is uncertain about his tentative generalization and wishes to be confirmed in his hunch. Since students are not allowed to ask a question in English, they usually retain their confusion on the particular point. In such a case, it would be appropriate to suggest a reference grammar where the student can find the needed statement synthesizing the underlying grammatical relations.

The rationale for dialogue memorization includes: better imitation of sound and intonation pattern of the target language, situational meaningfulness of utterances, and learning of judiciously selected structures. Overlearning of linguistic structures is expected to result in the transfer potential and in easier manipulation of transformation drills, etc. Although these objectives are respectable in themselves, it may be argued that their realization does not necessarily nor automatically follow from dialogue memorization. Let us point out that since translation is not tolerated by the A-L method, the semantic content remains a superficial and the least stressed feature of the new utterance. This is incompatible with the claim of the situational meaningfulness of utterances. In practice, even if a vague idea of meaning is initially gathered by the student, he is not allowed to verify the same first, but is rushed instead to parrot the entire chain of utterances with the emphasis on preserving the speed and intonation pattern of the model. In this manner the entire activity turns very easily into a truly mechanical exercise in repetition and the transfer potential of a relatively meaningless string of utterances can obviously be only minimal. It is common knowledge that comprehension of the foreign language exceeds the student's ability for production, particularly at the early stage of language learning. Accordingly, if priority is given to imitation of sound and the meaning is treated as a secondary feature, the student is doubly handicapped first by insistence on his weaker and functionally unmotivated capacity, and second by elimination of a source of motivation that otherwise could be found in the rewarding experience of achievement—if comprehension were given due priority in the process. In her study of the structure and process in language acquisition, Ervin-Tripp (n. d.) seems to underline the fundamental role of interpretation or comprehension when she points out that children will often respond to the content of the utterance they have been asked to repeat only. In this fashion the meaning inherent in the dialogue situation is minimized by the negative impact that the dull procedure of "memorization drills" has on students' motivation, and by the consequent absence of any degree of identification which is the prerequisite for a fruitful role-playing experience. We must also consider the potential for boredam and revolt contained in the practice of imposed parroting of someone else's remarks and messages—without the underlying matrix of thought and feeling. The same criticism can be directed against structure drilling owing to the cumulative effects of: gradual diminishing of students' attention; the proportional shrinking of meaning; and, the increasing reliance on the mechanical element in the repetition. Speaking from classroom experience Gefen (1967) complains: "Unfortunately, many linguistically-oriented drills are deadly dull and so intent on avoiding the distractions that a meaningful content to the pattern might offer, that the learner sees little or no connection between these boring exercises and that promise of wider cultural horizons or of communicative facility which originally motivated his learning". It is ironical to recall a rather fatigued cliché that advocates of the A-L method have been using to describe a certain traditional approach as teaching about the language and not the language itself, for it has become more and more apparent that the A-L method teaches structures and not the living language either.

CONTRASTING FEATURES OF THE TRADITIONAL APPROACH

At this point it would be appropriate to briefly contrast the A-L method with the so-called traditional approach in second language learning. In the first place this label provides only a vague reference to anything that could be more or less directly opposed to the positions of the A-L school, and consequently it is said to contain the sum total of "absurd" practices in the light of "our scientific certainties" concerning language learning process. Obviously, the reality of the situation is too complex to be described in oversimplified generalizations. For example, since learning of vocabulary in context is doubtless the most adequate way of dealing with new words, it has been taken for granted that the traditional approach must be guilty of rote memorization of vocabulary lists, on the ground that some old school teachers and textbooks offered such lists in each lesson. The only difficulty with this generalization is that the way the vocabulary items were manipulated depended exclusively on the competence and teaching ability of each individual teacher--and not on a prescribed procedure. Nevertheless, if we start from typical strategies prescribed by the A-L method we can identify more closely those points from which the old practice showed most divergence, and try to reduce them to a common denominator. Accordingly the more salient differences are found in: the treatment of grammar, use of translation, and orientation to culture. In short, translation was employed to ensure, verify, and reinforce comprehension. How much this practice involves the tendency toward literal translation is, to say the least, a debatable question. Grammar was taught analytically and prescriptively, which goes to say that students were expected to develop the ability to identify constituents of syntactic structures and to know how and where they may be appropriate. Interestingly enough, these aims are considered to be legitimate and consistent with the function of the "pedagogical grammar" as it is conceived by the generative grammarians of today (1965). The old school approach generally emphasized culture, but it did so in a restricted way to include elements of distant cultural heritage by sampling of classical literature. On the other hand, the A-L programs are hardly in a position to offer satisfactory models in this respect for, although authenticity of the colloquial language in contemporary contexts is emphasized in their textbooks, the substance of dialogues is deplorably narrow and confined to surface phenomena.[1] Jovaux

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[1] A relatively recent development promising a new outlook on cultural content in foreign language programs is exemplified in the excellent work of Camille Bauer. His *La France Actuelle* and *Panorama de la France Moderne* deal with topics in which a wide spectrum of attitudes, feelings, and beliefs of the French people are revealed as they have evolved from the past, and they are compared and contrasted with the generally held views by Americans, so that development of a cultural perspective is made to be relevant and realistic as well.

(1965) expresses a balanced criticism of the extreme positions in his statement that "... much was wrong with the situation then [i.e. in the past], for reducing foreign language study to reading and translating is as unfair and as stultifying as reducing it to oral comprehension and speaking ability—especially when the latter is still further reduced to its least-human aspects, the reflex mechanism."

SUGGESTED TECHNIQUES FOR MEETING COURSE DEMANDS

In accordance with the foregoing, a serious reconsideration of the priority of meaning equivalence in the form of competent translation seems to be indispensable in view of the crucial role played by the semantic elements in the process of overlearning of the new structures. To minimize the possible pitfalls of literal translation in language production, the emphasis must be laid on expressions and cliché-asscoiations among lexical items, which make for the acquisition of sensitivity approximating that of the native speaker. For example, since words differ across languages in respect to their semantic restrictions, it is necessary for the student to learn every new item as it is found in the sentence. Thus a verb requiring a preposition in French but taking a direct object in English will be identified and manipulated accordingly until sufficient overlearning is achieved. Let us add immediately that the use of translation is considered an indispensable aid at the stage of initial learning of particular forms, and that systematic use of the foreign language is to be encouraged as soon as adequate comprehension of the meaning is ensured. Application of newly acquired vocabulary and structures must follow the initial learning so that vocabulary development parallels expansion of linguistic competence.

Since some students will have difficulty in accomplishing the task of dialogue memorization, it would be advisable that they first make certain that each utterance is clearly understood before they attempt to imitate and memorize them. At times, students may find it helpful to replace the names in the dialogue with those of their friends, as well as to substitute names of places with other names and the like, in order to verify their understanding of the meaning. Since language use and the living language are emphasized, it is maintained that meaning is the primary element and the sine qua non of a meaningful practice.

As we have observed earlier there is a problem of rapprochement betwen students and the foreign language experience today. Possibly, the day is not far in the future when we will give students credit for having rejected an experience which was found to be weightless on their scale of relevance. We cannot help being optimistic, however, because foreign language experience can obviously be a learning experience of great potential, and because more and more enlightened voices are heard calling for the neglected and the missing quality in today's instruction—the same quality which had earned a place for the foreign language experience in the curriculum of general education initially. Let us define it as the potential that adequate exposure to a foreign culture contains for humanizing the young and for making them fit to live richer and more rewarding lives in a pluralistic world where knowing and understanding the difference makes for meaningful communication—and, consequently, for true membership in a cosmopolitan society.

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ONE APPROACH TO TEACHING QUANTITATIVE METHODS TO GRADUATE STUDENTS IN EDUCATION

The status of research in education has been growing over the years until, at the present time, some type of training in research methodology is deemed of enough importance to be required of all graduate students. The outcome of this situation in the College of Education, University of Maryland, is to require at least one course in quantitative methods of each student in the graduate program. It appears that this requirement is viewed with consternation by a large majority of the population since the word quantitative implies mathematical and/or statistical skills (even math and statistics are highly correlated in the students' minds). Math is viewed with, if not downright horror, at the least a "sinking pit of the stomach" feeling by the typical student in education; many have had previous experiences with math courses as undergraduates, the outcomes of which appear to be, at the best, neutral and, at the worst, experiences of total defeat and humiliation. Many other students have had no formal mathematics since junior high school. Thus, the typical education student approaches a course in quantitative methods with many apprehensive feelings which appear, in turn, to create a rather high anxiety level and what might be termed a negative attitude toward the whole area.

In addition to this situation from the students' point of view, add the faculty reaction of accountability for those of us charged with instruction in this area. A typical comment which could clarify my meaning here might be, "I have an advisee who got an A in your course in statistics but he doesn't seem to know anything about stat."

or "How is it that students who have taken research design from your department can't even devise an average questionnaire or design a simple comparative study?" These questions, unfortunately, are all too often valid ones, at least from my personal point of view.

Needless to say, if this is not a typical education problem, there is little in my remarks today to justify my being here. My impression, however, is that it is indeed a common state of affairs throughout graduate education training for a large portion of students and faculty.

"So what?" you ask. What can be done to increase learning, decrease forgetting, make skills relevant, reduce anxiety, etc. in the area of research in education? Beginning in the fall of 1969, a new sequence of two courses was introduced. The sequence is called Quantitative Research Methods I and II. They are intended to provide an introduction to educational research methods and more generally to the use of quantitative methods as applied to education problems. The two-semester sequence begins with emphasis upon the nature of research designs, followed by a general introduction to the use of statistical methods in research. Next comes an introduction to the nature of measurement and the construction of measurement instruments. The last topic covered in the first semester provides an introduction to inferential statistics. The second semester continues emphasis upon the more traditional statistical and measurement techniques, including introduction to computer utilization and the selecion of statistical analyses relevant to specific experimental designs.

The primary thrust of the sequence, particularly in the first part, is to introduce quantitative methods within the context of their use—research situations. The courses thus stress direct involvement of students in research planning and data collection activities. Several options are made available so that students may select those most closely in line with their own interests. A trite phrase, appropriately applied here, may be "learning by doing" and some examples of this are:

a. Teams of 4 or 5 students are formed in the third week each of which replicate an experimental study (or part of one) reported in the literature. The teams plan and carry out the replication and report the results.

b. Similar teams are formed to construct a measurement instrument. Each team elects to construct an achievement test or a questionnaire/attitude survey scale. The instrument is used to make a group comparison of some kind (e.g., to study age or sex differences, treatment group differences on the variable measured, and the like).

c. Statistical procedures are applied to the data of the students' own choosing.

d. The principles of reviewing and abstracting research literature are presented and students are required to do at least three of these during the semester. These abstracts are done in the student's own area of interest and are chosen with the intent of the student defining a researchable problem for which a formal research proposal is developed during the second half of the course.

e. The material covered in the second semester emphasizes the selection and application of inferential statistical tests to the data collected by the student in the first semester. This is done to increase the relevance of inferential statistics in general, and to the student's area of interest in particular.

A description of the setting in which all this occurs may be appropriate at this time. The sequence carriers six semester hours of credit. (3+3), and each semester is of 15 weeks duration. The courses meet three hours weekly; the first hour is a large lecture which is topic oriented and covers basic concepts from the relevant material assigned in readings. The large lecture groups are broken into small sections (N<26 in first semester, <36 in second semester) which meet for a two hour block of times scheduled on subsequent days after the lecture material has been presented. The two hour sections are divided so that the first hour is spent reviewing and clarifying material presented either in lecture and/or in reading assignments; the second hour is designed to be a laboratory period wherein the relevant activities take place. A syllabus is presented at the beginning of the course which includes a detailed outline of the course content relevant to each topic, a list of necessary background readings, a list of key concepts, and a list of skills which are to be developed on the basis of the content. The lectures are presented by regular faculty and the course sequence involves the total faculty so that students become somewhat acquainted with all the instructors in the Department. Common exams and a single grade distribution is used, hopefully cancelling out the marking differences which typically exist when multi-sectional courses are taught singly by different instructors.

How is it working? The evaluations are, of necessity, highly subjective at this point. The total impact appears to be positive, however, as evidenced from voluntary student critiques and verbal comments made to instructors and to faculty in other content areas. The learning by doing concept is singled out for high praise by many students; the course is seen as relevant, as compared with the more traditional approach found in beginning statistics and research methods courses. Having taught beginning courses in measurement, statistics, and research methods myself using the traditional approach for years, it was usual to hear complaints about the content being unrelated to the students' interest and needs—an inference that what was being taught existed in some kind of vacuum. This complaint is seldom heard now. Another frequent complaint was repetition of content as a student went through three separate courses of measurement principles, research methods and beginning statistics in education. The duplication of content has been virtually eliminated in the present offerings. Also, comments about the retention of knowledge are much less often heard from student advisors.

The faculty of the department is preparing materials using various media, audio-visual materials, tape-slide presentations, etc., with the idea of creating a learning laboratory. By making such materials available on call, it is hoped that the need for lectures will exist no longer and the time now spent therein can be devoted to individualization of instruction.

A graduate student in the Department has become interested in the question of attitude toward mathematics as a variable affecting achievement in quantitative methods courses in education. Some data available at present on this question indicate the possibility that some relationship does exist. During the summer session, 1970, a correlation matrix (Table 1) was obtained showing the relationships between the final exam and selected independent variables. The variables investigated were a math pretest, a statistics pretest, a course midterm examination, a math attitude scale, and the course final examination. The data were collected in Intermediate Statistics in Education, the course which follows the sequence discussed above. A large proportion of students in this class had taken the sequence previously.

Table 1

Correlation Matrix

Source	stat pretest	midterm exam	math attitude	final exam
math pretest	.18	.60	.42	.50
stat pretest		.35	.05	.30
midterm exam			.16	.51
math attitude				.12

In a multiple regression, the variables in their natural ordering were midterm exam $R = .506$; + math pretest, $2 = .563$; + stat pretest, $R = .578$; + math attitude, $R = .595$ when used in combination to predict the criterion, final exam scores.

The math attitude scale was administered to all students enrolled this fall in the beginning course in quantitative methods. For an N of

226, out of a total score of 80 possible points (positive attitude) the mean score was approximately 42 points. A significant difference existed between the average scores of men ($N = 84$, $\overline{X} = 46$) and women ($N = 163$, $\overline{X} = 40$). As might have been anticipated, women more frequently held a negative attitude toward math, as measured by this scale. Parenthetically, it is also the case that more women than men are usually found in our graduate school of education. As of this writing, the correlation between the math attitude scale and the first exam was .18, an index significantly different from zero at P_{05} level.

The relationships among the many variables which may account for the typical learning-instructional situation in the math/statistics area are apparently most complex and certainly quite unclear. Whether the lack of math skills and understanding leads to a negative attitude toward this content area or whether the negative attitude which may be of long-time duration precludes the attainment of the necessary skills is obviously a "chicken and egg" question at this time. Certainly much more research is needed but to me the primary factor is attitude and, hopefully, the implementation of the quantitative methods sequence described in this paper is an attempt to change the negative to the positive and thus to create a more favorable climate for learning to occur.

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STUDY SKILLS REQUIRED IN "RELEVANT" BIOLOGY COURSES

College courses in the natural sciences differ markedly from school to school and from course to course. The diversity of biology courses has increased in recent years. The presence of this array means that the knowledge that one individual has of the study skills required in college biology courses relates only to a minute portion of the spectrum.

At the University of South Florida we have separate introductory biology courses for majors and non-majors. My remarks concern only the impressions that I have gathered as a Biology Professor in my sections of the non-majors course.

This fall we have changed markedly the character and, to some extent, the objectives of the course. After comparing the previous form of the course with its present composition, I would like to discuss the additional stresses that this change has brought to bear upon the study skills of the students in the course.

The former course resembled typical biology courses in that it used the textbook as the principal source of information. The majority of the classroom time in my sections was conducted in a question and answer format. That is, the students asked questions on points that they did not understand and I supplied answers that, hopefully, were adequate.

On numerous occasions, I asked questions about phenomena that most people have seen in order to get the students to relate these to the principles that we were studying. An example is the consideration of the question: "Why do people water lawns after spreading chemical fertilizers on them?" after we had studied the topics of osmosis, diffusion, and active transport.

The students were also assigned articles from Scientific American and other magazines. These articles dealt with areas of current rapid progress in biology.

With the initiation of the new course organization this fall, we introduced paperback books on particular subjects of interest and articles of a controversial nature. Other assigned articles are, in part, factual but their main object is to introduce a problem rather than to impart data. Sources for these articles include New York Times Magazine, Today's Health, Journal of American Medical Association, Harper's, Scientific American, Fortune, and Saturday Review.

The consideration of each topic starts with the study of appropriate chapters of the textbook in order to establish certain biological principles that are germane to the area—in my classes this segment still follows a question and answer format.

We then analyze parts of the paperbacks and the articles. This examination includes identification of the salient point a search for the evidence cited in support of this point, and a critique of the entire article. All of this is led by students.

You can already understand that the study skills required by these two approaches are different. For the previous course I believe that the skills may be enumerated as follows. The ability to read a chapter of the text and from this to formulate an overall outline of the material in the chapter. The ability to find the important facts in the chapter, memorize them, and to relate them to the overall scheme of the chapter. Even beyond this, they must relate this scheme to the material in preceding chapters. The ability to form a mental image or model of the operation of these systems and then to apply this model to situations that they see around them in their lives.

In this case, by concept formation, I do not mean the apparently inherent abstracting and generalizing that we all do but rather a deliberate effort to form a theoretical construct and use it in trying to understand familiar events.

Under this system the students primarily seemed to lack two skills. *Vocabulary.* Not only are they deficient in vocabulary but they seem incapable of determining the meaning of a word by breaking it up into its parts. A student asked the meaning of the word interconvertible. After I broke the word into two parts for her, she gave me the answer without further help. This lack apparently extends to an inability or unwillingness to use a dictionary. *Knowledge of English syntax.* One of the results of this shortcoming is the confusion of cause and effect. After reading the sentence "Abnormal changes in mitochondria are typical of scurvy and possibly other diseases," one student wondered whether scurvy was caused by a lack of Vitamin C as he had heard or a change in the mitochondria as stated in the text.

Because the consideration of each topic in the new course starts with material from the text, the same study skills are required as before but these are no longer as important. Additional skills are now necessary. These include: The ability to organize the material presented in the assigned articles. Unfortunately many articles on interesting aspects of today's problems are not well organized. Therefore the student is left with the task. Most of them seem to feel that everything that is written is law and perfectly organized. The ability to pick out the main points in the argument for each article. The ability to identify the evidence that is presented in support of the argument. The ability to evaluate the article on the dual bases of the evidence presented and of principles derived from the text. Apparently the only experience that most of our students have is in finding individual facts and memorizing them. They are not able to change their method of study with a change in the type of material.

We expect our graduate to be able to read with understanding and discrimination articles in popular or semipopular periodicals; therefore we must give them practice in the techniques. However, we realize that a person with the requisite skills is rare among freshmen and sophomores, the usual constituency of this course.

In recognition of this type problem ten years ago Carter (1960) suggested several roles for the classroom teacher. Two of these seem appropriate. We expect to spend time developing necessary technical vocabulary. We screen material rigorously to insure that the level is suitable for our students.

However, in view of the marked diversity of student preparation, I do not believe I should spend classroom time to make up deficiencies in some students' backgrounds. Nor do I feel that it is desirable to demonstrate techniques of studying material such as the text that is well organized.

It is my opinion that the frequency of courses of the same type as our current curriculum will be increasing on the college and university campuses in the next few years. If students are going to make good use of these opportunities, they must have a variety of study skills. Somehow possession of these must become the norm for students rather than the exception. At the present time, much of the burden for providing aid in the development of these talents falls on individuals concerned with improvement of reading and other study skills.

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ESTABLISHING A TEAM READING PROGRAM

I joined the faculty of Suffolk Community College with the task of establishing a reading program to serve the needs of the students at this institution. By describing the procedures I undertook, it will hopefully provide guidelines for those who wish to begin emplementing a TEAM Reading Program. Initially, however, I will briefly describe the TEAM Program to provide a framework for understanding the team reading course.

TEAM is an educational response to students who enter college with academic deficiencies, cultural differences, linguistic handicaps or economic deprivations. It attempts, in a single semester, to remediate identifiable reading, writing, and mathematical skill weaknesses. Moreover, it attempts to teach study skills, and to fill educational voids which might preclude success in college. An integral part of TEAM is its emphasis upon student advisement and counselling. Those directly involved with the students of TEAM include five instructors and a counsellor. Each of the instructors is also regularly scheduled to sit in one of the classes. Thus, the social science instructor visits at least one of the reading, mathematics, science, and humanities classes during a week.

The cultural component of TEAM is very important. Every Wednesday of each week there are student-faculty cooperatively planned activities. During the semester students have visited museums, made ecological field observations, and viewed such films as *David and Lisa, Twelve Angry Men, A Time for Burning, Night and the Fog,* and

Nothing But A Man. Moreover, there are future plans to attend a Broadway play and to hear guest lecturers. A less visible cultural activity are the informal rap sessions held at student and faculty homes. These "fireside chats" serve as a forum for free expression of ideas, and most importantly assist in breaking down invisible barriers which hinder student-teacher discourse.

TEAM reading is a single course in the total program, but it is acknowledged to be the focal point or core of the academic program. The reading instructor's responsibility includes the teaching of reading and study skills required in all disciplines. Therefore, any reading material assigned in the course is also analyzed and used as instructional material by the reading instructor. Each teacher is fully cognizant of his role as a reading instructor. Thus, advice is given by the reading specialist on the selection of materials, and its method of presentation.

The establishment of a TEAM is obviously not a simple matter. Interestingly enough, TEAM did not begin as a program for only educationally disadvantaged students. It was and is felt by many at our college that TEAM should be taken by every entering college student. Other departments are beginning to consider a TEAM approach and we hope to more than double the size of our program next year. But, not all the mechanics of organizing a TEAM reading program have been answered.

I would suggest that a committee of faculty members, representing different departments who share a common commitment to a program such as TEAM be formed. The advantages are: by establishing a pilot committee many of the potential administrative and educational problems can initially be obviated before the final presentation to the faculty senate; having representatives from different departments indicates a recognition on the part of some members of every department of the educational problems they encounter, and moreover, these representatives may suggest individuals whom they feel could teach in a program as demanding as TEAM. I would also suggest that a librarian and the Director of Institutional Research be a part of such a committee.

The Director of Institutional Research is a most valuable individual. (In establishing the TEAM program our director, Dr. Paul Libassi, was able to provide us with statistical correlations of the probability of student success and student reading ability.) He can serve to interpret test results to administrators, teaching faculty, and counsellors.

With the aid of the data provided, the committee should now be prepared to indicate the number of students to be served and the physical facilities needed. But the most important function of the committee should be the indication of broad goals. The specific behavioral goals and methodology should be the function of those instructors who will eventually teach in the program. This original planning committee can also serve as an advisory resource body once the actual teachers have been selected. We have found this committee to be an excellent liaison to the entire faculty.

The rationale for a TEAM-Reading approach to the educational problems presented by educationally different students must be clearly formulated. First, it should be indicated that reading and writing are skills utilized throughout the curricula and that to provide isolated sections of reading and writing classes divorced from the content areas, though valuable, is certainly less efficient in terms of student progress. Second, the college community must be made aware of the extreme difficulty, and at times futility, of providing students who are reading below the 25th percentile with material at a college level. Yet, this is a rather normal procedure at many colleges.

After the TEAM concept has been approved, the reading specialist needs to examine three areas: input (student abilities and disabilities); methodology (course of instruction); and evaluation (criteria for success).

The group reading tests can provide part of the input data; however, the reading specialist should establish clear guidelines to obtain further data. After the initial screening performed by the survey test, an analytical, semi-diagnostic test which provides more diagnostic data should be selected. Once the above tests have been analyzed informal reading tests should be given to assess students' reading abilities in the content area. I selected material from introductory mathematics, social science, science, and humanities books. Utilizing the cloze procedure and open ended questions, I was able to obtain a clearer picture of particular reading strengths and weaknesses in the content areas.

Other data of vital concern are: the linguistic background of the students; the socio-economic-cultural level of the student; the academic and career goals of the students; the student previous academic record. Much of this data was obtained from the Student Personnel Division of the college.

Once this data has been compiled, analyzed and interpreted by the academic teaching faculty, behavioral course objectives and methodologies should be established. For instance, each instructor at Suffolk prepared a tentative course outline stating the specific behavioral outcomes he desired. Much of the tentative reading material to be used was also discussed. I use the word tentative intentionally because a TEAM program involves a commitment to innovation, which assumes maximum flexibility. As an example, much of my academic preplanning had to be reworked to mesh with others. The mathematics and science instructors had to compromise at different points in order to truly integrate their courses. The humanities instructors had to omit some of the more esoteric reading assignments. The social science instructor had to compromise on the extent of outside assignments.

I hope it is evident that perhaps the largest danger to the success of the program are the personalities of the team staff. The staff must be flexible, open to criticism, and cooperative. If the team is to succeed, meetings are extremely important. They provide an opportunity to: share insights; correlate material; review successes and assess failures; evaluate student growth.

The final responsibility of the TEAM faculty is the total evaluation of the program. The evaluation should be performed in a variety of ways. With the assistance of the Director of Institutional Research, much of the measureable gains will be analyzed. With the assistant of the counselling division, changes in behavior and attitude will be assessed. Moreover, the faculty will do a self-evaluation, and the students will also evaluate the program. However, it should be remembered that TEAM was initiated to improve the academic performance of students.

Those instructors who currently compose TEAM will act as faculty advisers for the team students during the remainder of their college years to maintain contact with the students.

In summary, to establish a TEAM reading program one must clearly have the objectives defined, organize a planning committee, involve the total college community, establish a workable framework, select flexible and dedicated instructors, obtain diagnostic data, plan methodology, and establish evaluative procedures. I have found TEAM to be the most exciting educational experience I have encountered.

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ASSESSMENT OF FLEXIBLE EFFICIENT READING

The importance of flexibility in reading has been recognized, to some extent at least, for over forty years. As Harris (1968) has pointed out, there has been little argument about whether an efficient reader should make appropriate variations in his rate of reading to fit his purposes for reading and the type of reading material since Yoakam (1928) categorized four main rates of reading: slow, careful reading; normal or usual reading; rapid reading; and skimming.

SKIMMING IN FLEXIBLE READING

In general, the idea of flexible reading has been used to embrace the implications of efficient reading. However, efficient reading has not necessarily included the concept of flexibility, the appropriate adjustment of reading rate or using different reading strategies. Flexible efficient reading refers, in short, to the process of securing from the printed page in the shortest possible time and with the minimum of stimulus input that meaning or information which is dictated by the reader's specific, immediate and long-term purposes. Flexibility in reading is predicated upon the assumption that the reader is capable of using a range of reading rates, i.e. a range in the sense of a continuum from slower to faster. Adjusting reading speed has not been clearly distinguished from the idea of using different reading strategies. However, it seems apparent that one of the important strategies required for flexible efficient reading is the skimming strategy.

It can be argued that skimming is an integral dimension of flexible reading performance. This is true by virtue of defining skimming as that reading behavior in which information is processed without looking at all or most of the words. Thus, skimming necessarily involves a kind of functional, visual contextual restraint. Spache (1962), Taylor (1963) and Tinker (1950, 1963a, 1963b) on the basis of their extensive studies involving eye-movement photography, have all asserted that any rates in excess of 800-900 wpm necessarily must be considered to be skimming rather than reading. This means that a reader must skim, i.e. he must use visual contextual restraint, if he is to achieve rates in excess of 900 wpm. In practice, readers may very well adopt a skimming strategy at rates well below 900 wpm.

Theoretically, at least, the use of visual contextual restraint suggests that the reader will look at or fixate upon those parts of the discourse which communicate the most meaning or information. In general there are two strategies which the reader can adopt in the process of skimming. One approach is to look at all or most of the words in selected sentences and to refrain from looking at the other sentences in the paragraph altogether. This is sometimes referred to as the topic sentence approach. The other basic approach to skimming involves looking only at the most information-bearing words in most of the sentences in the discourse. This is called the key word approach.

Nacke (1970) recently conducted an investigation of skimming behavior in which both the strategy variable and the amount of processing time were carefully controlled. The results of this investigation tend to support the strategy of skimming by looking only at the key words in the continuous discourse. At any rate, it is essentially through skimming that a person is able to achieve the faster speeds in flexible reading. Further, one of the major complications of assessing flexibility rests in the fact that to the present, no satisfactory test of skimming performance has been developed.

FACTORS AFFECTING FLEXIBLE RATES

The three primary factors generally considered to affect the speed with which printed material can be read are: the reader's purpose for reading, both internal and external; the level of difficulty of the material, terminology and level of ideation; the degree of familiarity or prior knowledge of the subject matter.

Consideration of these three factors reveals that they are not mutually exclusive. The level of difficulty may be influenced by a person's prior knowledge and the difficulty may also affect the purpose or degree of mastery and recall which a reader sets as his goal. Too, as Braam (1963) pointed out in connection with the basic problems concerning the evaluation and control of the factors relating to flexibility, "the purpose for which a person reads may be the result of needs arising from external, internal, or combined external-internal motivation." Carillo (1965) has suggested that other factors which influence flexibility include the typography, external distractions, the interest and energy level of the reader.

Letson (1959, 1961), Sheldon and Carillo (1952), Spache (1963), and McDonald (1963, 1965, 1967) have discussed at length the complexity of the skills referred to as flexibility. Since that time there seems to have been little progress toward clarifying the issues or resolving the problems associated with the measurement and nature of flexibility in reading. The literature still reveals considerable disagreement about the specific nature of flexibility, as well as the ways of measuring it. Attention in the rest of this paper will focus primarily on the issues associated with the assessment of flexible efficient reading.

EXISTING TESTS OF FLEXIBILITY

The formal tests currently available for assessing reading flexibility are the *Reading Versatility Test* by McDonald and others (1968) and the *Flexibility of Reading Test* by Braam and Sheldon (1959).

There is a fundamental difference between the *Reading Versatility Test* and the Braam-Sheldon instrument. In the former, the reader is directed to read four similar selections for four distinctly different purposes: rapid reading, thorough reading, skimming for main ideas, and scanning to find the answer to one specific question. On the other hand, Braam and Sheldon ask the reader to get thorough understanding on each of five selections which differ in subject matter or content area and in level of difficulty. Both tests are administered in a time-amount situation rather than a time-limit condition.

The Braam-Sheldon test seems to be based upon a definition of flexibility which does not provide for the application of different reading strategies since the purpose for reading remains constant. Presumably, then, variations in rate among the passages for individuals would be accounted for as the combined effect of such variables as processing or thinking time, familiarity with content, interest and motivation. Another troublesome aspect of this instrument is the fact that comprehension is checked by means of the true-false items for each passage. Berger (1966, 1969) has developed multiple-choice test items for the *Flexibility of Reading Test,* however, which would seem to be some improvement.

There remains the question, with all multiple-choice comprehension test items, of the extent to which the questions do reflect the true amount of information gained. This is certainly true for the *Reading Versatility Test,* particularly with regard to the problem of measuring the comprehension of main ideas for which three questions are provided. Maxwell (1969) has made the distinction that the *Reading Versatility Test* does give an indication of whether a person is able to skim or not, but that it does not reveal the extent to which he has developed the ability to skim.

Spache and Berg (1958) developed a test of flexibility which is now out of print. The procedure for this test required the reader to process a single article several times, each of which was prompted by a different specified purpose. This rationale could combine features of the *Flexibility of Reading Test* and the *Reading Versatility Test* if it were applied to passages representing several levels of difficulty. It seems to deserve further consideration.

Raygor (1970) has developed a test which inherently includes some aspects of flexibility in that it provides rate and comprehension scores on an easier passage and a more difficult one. In addition, there is a 30-item skimming and scanning time-limit test. In reality it seems to be much more of a scanning test than one of skimming in that the task is one of finding the answers to the questions in indexes, charts and other formats found in textbooks. The opportunity for skimming is minimal and is obscured in the directed-reading activity anyway. Therefore, it would seem more appropriate to refer to this subtest simply as a scanning activity. This would also help to minimize the confusion regarding the definitions of skimming and scanning.

The *Iowa Silent Reading Test* is in the process of being revised and, according to Roger Farr, the new version will also include a subtest on scanning variations in a directed reading activity.

Darby and Carver (1970) have recently developed a test which gives a reading efficiency score (along with an accuracy and a rate score). This efficiency score, however, is not one which overtly accounts for the application of various strategies including skimming. A promising feature of the *Carver-Darby Chunked Reading Test* is the unique way in which information gain or comprehension is assessed. The following explanation of the technique is taken from the test manual.

> The chunked test items on each reading passage consist of the same passage retyped in 100 groups of words—each group known as a "chunk"—in 20 sets of five chunks each. A "chunk" is a group of from one to five meaningfully related words within a sentence. Within each set of the five chunks one chunk has been changed in meaning from the original passage. The examinee's task for a single test item is to identify the changed chunk in each set of five chunks. (Darby and Carver, 1970).

In addition to the formal tests of flexibility in reading, Letson (1960) has presented procedures for measuring flexibility informally. Maxwell (1969) has discussed briefly the use of informal time-limit activities.

Rankin and Hess (1970) have developed a new method of measuring internal or intra-article reading flexibility. This procedure, although not standardized, has the distinct advantage of revealing the degree of reading flexibility in the form of a flexibility coefficient. This coefficient is determined by computing a Pearson correlation between the distribution of successive rate measurements (the number of fifteen-second intervals required for processing 100-word segments) and the distribution of successive difficulty measures (cloze scores per the same 100-word segments). The levels of difficulty within the stimulus passage is the independent variable, here, rather than variations in the reader's purpose.

OTHERS FACTORS IN MEASURING FLEXIBILITY

Carver (1970) has suggested that two of the most important variables for predicting information gained or retained from prose materials are the strategy (plan, program) that the individual uses in the learning (reading) situation and the amount of time which the person spends in the learning process.

When the time-amount method is used to measure flexible reading performance it does not seem likely that reliable information can be obtained with regard to the strategy variable for one then knows only the extent to which the processing time was used effectively (providing background information was properly controlled). If genuine progress is to be made in investigating the nature of flexible efficient reading, it is extremely important to ascertain objective information about the strategy or procedure which the reader adopted during the specified processing time. In other words, it is expedient that we learn how the reader is spending his time, whether he is skimming, scanning, skipping, reading each word or re-reading. Rankin's flexibility coefficient takes the strategy variable into account to some extent.

The amount of background information which a person has about the subject matter or content of the stimulus passage is commonly considered to affect reading performance (Kingston, 1961, Mc-Donald 1963). The argument is that the reader who has more background information about the subject matter of a passage will find the material easier to read than a person who has little or no background information about the topic. Weaver and Bickley (1967) have suggested that reading in most situations is actually a "selecting of the parts of what we already know." Reading in this sense becomes essentially a process of confirming what the reader already knows, particularly if the reader is responding primarily to the cues in the material about which he already has information. Weaver's point of view may be even more relevant to the process of skimming, or rapid and efficient reading in general, than it is to reading slowly and carefully. Certainly, a reader must, at the least, know the meanings of referential words in a passage and be able to make some appropriate associations among the meanings to gain information from the printed discourse. Otherwise, decoding printed discourse is not possible at all, for reading necessarily requires some level of background information. That the amount of background information is closely related to the skimming performance of grade eleven students has been verified by Nacke (1970).

Reading comprehension has typically been measured without ascertaining the amount of previous information which Ss had about the subject matter before reading the material (Kingston, 1961). Since it is known that individuals vary greatly in the amount of background information which they possess, it is readily conceivable that two persons could obtain the same score on a comprehension test after reading a given passage even though they differed significantly in the amount of specific background information which they had before reading the passage. One person may have gained a great deal of information from reading, while the other person may have gained very little information that he did not possess prior to reading. It is extremely important, therefore, to assess the amount of previous information gained from reading (Rankin, 1965). Information gain is typically measured by administering a pre-test as well as a post-test of comprehension. The information gain score is calculated by computing the difference between the pre-test score and the post-test score for each individual.

Exposure to a pre-test, however, can be a confounding variable in research. Nacke (1970) found that exposure to a set of questions related to the content of stimulus passage served to induce familiarity with the content of the passage and apparently served to cue the reader to look for specific answers to questions when he subsequently skimmed the passage. In fact, skimming in this study was observed to be effective in some instances only when there was cueing resulting from exposure to the pre-test. The implications of these results appear to complicate the task of developing functional and objective instruments for flexible reading behavior since background information has been verified as a significant variable relating to skimming and, at the same time, the pre-test, which is used to control the background information variable, itself is a confounding variable.

The pre- and post-cloze approach to measuring information gain apparently has not been applied to the measurement of skimming performance. An investigation designed to determine the relative merits of multiple-choice questions and information gain as measured by 20 per cent key-word cloze tests is in progress. Even if the key-word cloze form of test is found to be a valid and reliable method for measuring information gained by skimming, it is still not likely that the cloze test would solve the problem of pre-test confounding. In fact, it is probably more likely to exaggerate the problem.

Carver (1970, 1971), however, claims that his chunked test items measure information stored during the reading process by virtue of the way in which the test questions were developed, i.e. no-reading vs reading. Herein, may lie at least a partial solution to the problem of measuring flexible efficient reading with multiple-choice questions without administering a pre-test. At the present, the chunked test item or variations thereof appear sufficiently promising as to merit further investigation.

SUMMARY

The problem of measuring flexible reading centers around four major issues. The first issue concerns the particular difficulty of measuring the faster rates of reading or those strategies involving the use of visual contextual restraint. Rate of reading (as words per minute or words dealt with per minute) may be misleading even if the timing is accurate since it typically does not reveal the reader's strategy, or pattern of attack, whether he skipped words, re-read parts, or read every word once. Time-amount measurements generally have not proven satisfactory. Time-limit assessments appear to be more promising in that a suggestive profile of the internal processing is revealed. Overall, the strategy variable in the measurement of reading has not received adequate attention.

The second major difficulty, superimposed on the first, .. concerned with the perennial problem of measuring comprehension, which is necessarily rate of comprehension when considering flexible efficient reading. The task here is even more difficult than in the usual survey or diagnostic test, where the directions normally dictate or imply careful, thorough reading. In flexible efficient reading, the reader does not always need to achieve thorough understanding in materials with different levels of difficulty and at the various rates. The types of main-idea and specific-information questions asked by the test author may or may not be appropriate for a specific reader depending upon the reader's internalized purpose in a specific content, his background information and interest in the topic. Further, the notoriously small number of questions used to evaluate the ability to skim for important ideas and to scan for the answer to specific questions is less than satisfactory both in terms of evaluating an individual's rate of comprehension at the given level and in comparing subjects' effectiveness in skimming and scanning. In the same realm, there is the problem of taking into account the reader's background information and the complication of controlling this variable through pretesting.

The third major problem, also closely allied to the first problem, relates to the controversy over whether variations in purpose for reading or variations in difficulty and type of material should be the independent variable. Perhaps it is becoming more apparent that both factors must be manipulated in order that the conditions of testing adequately reflect the opportunities which the mature reader has for reading flexibly and efficiently in the real world. On the other hand, there remains the difficulty of determining the extent to which the reader accepts or internalizes the various purposes (or strategies) for reading as stated in test directions. Again, this seems to be of particular concern in view of the fact that the reader's previous experiences with tests and other academic activities, either explicitly or implicitly, required careful, intensive reading.

The fourth important issue is concerned with the development of a functional index or scale of flexibility whereby the rate and comprehension scores on the activities of the instrument are integrated. The use of ratios between rate scores does not take into account the respective comprehension scores except as they are deemed to be either satisfactory or unsatisfactory. In addition, the use of ratios allows the subtests to be considered only as pairs.

The procedure of multiplying the individual rate scores by the respective comprehension percentage scores is even less satisfactory as a procedure for establishing an index of flexibility. In the first place, it puts an unreasonable premium upon the quality of the comprehension questions. In the second place, the validity of the procedure has been clearly illustrated by Farr (1969). Anyway, the result was still a score for each subtest or activity rather than an index score reflecting the reader's flexibility. The range score does not provide an adequate indication of flexibility.

The flexibility coefficient developed by Rankin and Hess (1970) as discussed above is the most creative attempt to solve this problem to date.

An additional point should be made clear. While informal tests can provide valuable diagnostic information upon which inferences can be made for instruction, measures of flexible efficient reading which are adequate for research purposes apparently have not yet been developed.

CONCLUSION

If the assessment of reading skills is a complex and controversial task which many specialists have attempted to resolve with a measure of objectivity and consistentcy but with only limited success, then assessment of flexibility in reading is a challenge with a higher order of complexity, even greater disagreement as to criteria and, indeed, one which has resulted in considerably less success to date. If flexibility and efficiency are the distinguishing characteristics of the mature reader, then it is imperative that valid and reliable measures of flexible efficient reading be developed. The objective measurement of flexible efficient reading behavior is fundamental for the development of a sound theory or model of this construct. At the same time, it is clear that a functional theoretical base must be established in conjunction with the development of appropriate objective measures. The current concern about accountability may very well focus on the urgency and establish a high priority for developing a sound measure of flexible efficient reading.

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THE MULTIPLE GROUP INFORMAL SILENT READING INVENTORY

Donald D. Durrell (1937) suggested that informal tests, based upon the materials of instruction, are usually the best means of revealing the suitability of materials for the child as well as for measuring his comprehension of classroom assignments. Betts described group inventories in *Foundation of Reading Instruction* (1946, pp. 479-481). Varied descriptions of group informal tests have been provided by Bond and Tinker (1957), Harris (1965), Bond and Wagner (1966), Marksheffel (1966), Heilman (1967), Strang, MacCullough and Traxler (1967), Strang (1969) and Stauffer (1969). These writers explore the group informal test in the light of how well the students in a class can or cannot read the textbooks the teacher expects them to use. The group informal used for placement analysis indicates can read and cannot read groups. Taschow (1967) suggested, in an article on Instructional Reading Levels in Subject Matter Areas, the possibility of obtaining further information by exploring additional student behaviors of the can read and cannot read groups. This paper outlines the use of the Multiple Group Informal Silent Reading Inventory (MGISRI).

The purpose of the MGISRI is to indicate a student's silent reading performances in terms of his ability to comprehend, recall, and communicate passages in a given textbook. Such information might help the student to change from dependent to independent learning, to stop further possible deterioration in reading, or possibly to prevent reading failure. The terms that are employed to designate this instrument are:

MULTIPLE indicates that the instrument consists of more than one measuring device.

INFORMAL declares that the instrument is appropriate to the daily teacher-student learning situation within any given classroom and that the instrument is not standardized.

GROUP purports the instrument's suitability for administration to more than one individual at one time.

SILENT READING conveys the manner in which the content of the instrument will be dealt with by the students.

INVENTORY suggests that the results obtained through this instrument may be tabulated in the form of a checklist.

The MGISRI is intended to identify the variability of the reading ranges of the members in the can read and the cannot read groups. It should allow the diagnosing of reading deficiencies so that teacher instruction and expected student performances in the subject matter areas can become more realistic.

MGISRI

The administration of a regular group informal test allows the division of the students into two groups: students who score 70 percent or better (+70) and students who score less than 70 percent (–70). Addition of multiple levels was sought first in a horizontal extension. Next a vertical examination directed towards individual diagnosis in silent reading was added. The vertical examination was an inventory type checklist used for diagnosing student reading behaviors.

The horizontal extension was achieved by administering simultaneously to the +70 and the –70 groups additional inventories of a higher or lower reading level respectively. Horizontally, then, this resulted in four groups based on reading level competency. The arrows in the diagram of Figure 1 following each result after the second administration of the MGISRI indicate the reading potentiality ranging from most able to least able readers. In the light of the multiple horizontal stratification it seems of great importance that the results and observations obtained by the MGISRI are treated as constituting a continuum in which the fundamental common character is maximum reading achievement, being of tentative nature, subject to change with instruction. Note the clear need for students in Group IV (Figure 1) to receive additional testing and presumably tutoring beyond the subject teacher's training and/or time.

The results obtained by the horizontal stratification are accompanied by an inventory type checklist to record behaviors observed while the students were engaged in the silent reading and in answering the questions. The teacher observes student behavior in terms of lip and head movement, finger pointing, twisting, looking around, and other behaviors that may deter effective work. The duration students need to read the assigned passage is recorded either in seconds or as

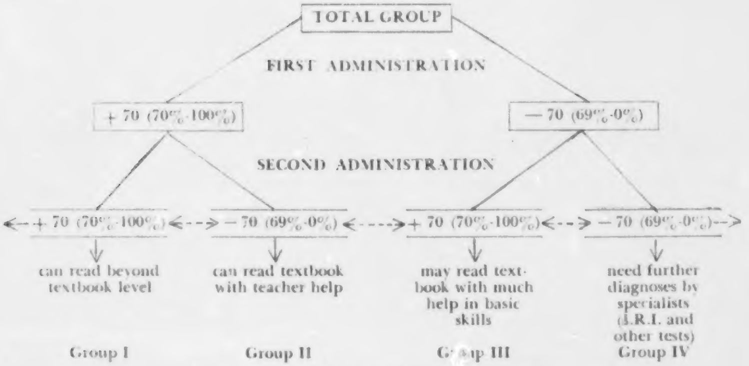
TOTAL GROUP
FIRST ADMINISTRATION
+ 70 (70%-100%)
— 70 (69%-0%)
SECOND ADMINISTRATION
+ 70 (70%-100%)
— 70 (69%-0%)
+ 70 (70%-100%)
— 70 (69%-0%)
can read beyond textbook level
can read textbook with teacher help
may read text-book with much help in basic skills
need further diagnoses by specialists (I.R.I. and other tests)
Group I
Group II
Group III
Group IV

Figure 1. Possible MGISRI Groupings

high, average, or low speed. The accuracy of comprehension is recorded either as a percentage or as high, (90 to 100 per cent), average (70 to 80 per cent), or low (0 to 60 per cent).

To report the obtained data from the first and second administrations of the MGISRI and to check the observed student silent reading behaviors, the inventory checklist (Figure 2) has been devised and found efficient for working purposes.

FIELD TESTING

From October 1967 to May 1970 a total of 3993 MGISRI have been administered to 1331 students. Of this number 924 students have been in 39 classrooms ranging from grade three to grade twelve and 407 have been community college students in their freshman and sophomore years.

Two approaches have been tried to make the MGISRI most useful. First, teacher estimation of student performances was sought prior to actual testing. To assure maximum compliance with the five inventory categories, teachers were given the same inventory checklists (Figure 2) as were later to be used for student scoring. This procedure was intended to serve later as an instrument of comparison of teacher estimated student behavior versus actual student behavior during task performance. Of the 43 teachers 25 returned the inventory estimations. Eighteen indicated that they did not know what their students' expected performances would be. Second, each teacher administered only the first part of the MGISRI. Teachers were then asked to react to the scores and observations in regard to teaching more effectively their charges. Responses disclosed that the teachers appeared at this time to have an indication of which students could and could not read the

		Student Names							
Information from:									
First Administration on	+70								
Textbook used in class	−70								
Second Administration	+70								
Above Textbook Level	−70								
Below Textbook Level	+70								
	−70								
Observations: Head movement									
Lip movement									
Finger pointing									
Twisting									
Looking around									
Speed in Silent Reading: High									
Average									
Low									
Accuracy in Comprehension: High									
Average									
Low									
Other observations:									

Figure 2. Sample Inventory Checklist

required textbook, but that they did not know which reading levels would be most appropriate.

SUMMATION OF THE INSTRUMENT

Results of the MGISRI are reported in five categories: the numerical results of the first and second administrations; observations of silent reading behaviors; speed of silent reading performances; accuracy in comprehension; and indication of the differing individual silent reading abilities in a group.

For the student the MGISRI can be an instrument of self-appraisal and insight. The student may become aware of his behavior during silent reading, handling the assigned materials, and performing the written task of answering the questions. Student insight may contribute to his understanding, his knowledge as well as his reactions to the entire process. Thus, meaning of his accomplished achievement, significance of his input-output activity, patterns of his silent reading efficiency or deficiency, and the use of this instrument as applied to his own reading-learning situation may enlighten the student toward more realistic goals.

For the subject area teacher the MGISRI may be useful in two ways. The more the teacher knows about this instrument, the better he can make it serviceable for the students and himself. It must always be kept in mind that the informations received from this instrument characterize reading behavior and performance of an individual student within a given group setting; must be interpreted in this light; and, should be treated as being tentative and modifiable through continuing instruction.

CONCLUSION

"When instruction is properly differentiated within the classroom, children in each group are ready to learn the next concept or skill with reasonable effort and speed [Sartain, 1968, p. 210]." While educators talk much about individual differences in the classrooms that necessitates differentiated instruction, most teachers appear to take the easy road out by teaching whole-class activities. Intra-group instruction as a result of the MGISRI will recognize the varying readability ranges within any classroom for more effective instruction. The MGISRI will act as a diagnostic catalyst that assists subject area teachers and their students to gain valuable insight into the ways of organizing ideas in reading, understanding and communicating them with adequate speed and accuracy. Simultaneously, the continuum of the MGISRI can disclose much needed diagnostic informations for guidance of able learners as well as towards possible correction of those reading deficiencies most often observed and known to interfere with successful student achievement.

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VERBALIZATION AND LEARNING OF PAIRED ASSOCIATES

Certain political, economic, and social factors have combined in recent years to bring the conditions and problems of the underdeveloped and disadvantaged segment of our population to the center of our attention (Coleman, 1966; Jensen, 1968b, 1969a; Moynihan, 1968; U.S. Commission on Civil Rights, 1967). There is general agreement that in the United States, a country of great wealth and abundance, there exists an unusually large number of individuals living in a subsociety of social, economic, and educational impoverishment (Coleman, 1966, 1968; Deutsch, 1964). Estimates of the size of this segment range from 20 to 40% of the total population (Deutsch, 1964). In addition, certain ethnic or "racial" groups appear to be somewhat disproportionately over-represented in this segment of the population (Coleman, 1966; Jensen, 1969a). A major problem of concern to the behavioral scientist as well as the professional educator is the failure of most of these disadvantaged children to acquire the basic knowledge and skills that are necessary for assimilation into a highly technical and industrialized society (Deutsch, Katz, and Jensen, 1968).

Coleman's (1966) comprehensive survey of public educational facilities in the United States revealed that about 85% of Negro elementary and high school students scored below White averages on tests of scholastic ability and achievement in every region of the country. In addition Coleman's survey showed that rural, southern Negro children scored below *all* other groups on these measures.

Within the past several years, certain Judicial decisions as well as other Federal and Administrative maneuvers have resulted in large scale integration of many southern schools based typically on hastily devised plans of desegregation with very little regard for the educational welfare of the individual child.

Faced with large-scale integration in most areas of the country (particularly the South), educators are becoming increasingly concerned with ascertaining the types and patterns of abilities which the disadvantaged Negro child brings to the learning situation and how these abilities differ from those of white children. In addition, given specific ability deficits, a major question becomes what training procedures can best overcome these deficits.

The present investigation is based on the postulates and hypotheses put forth in a series of articles by Arthur Jensen (1968a, 1968b, 1969a, 1969b, 1969c) in which he argues that Negro-white differences in intelligence and scholastic achievement are due largely to genetic rather than environmental factors, and that future educational policies should reflect the true nature of these differences. Jensen hypothesizes two broad categories of mental abilities: Associative abilities and cognitive abilities. He further contends that Negro children have relatively well developed associative but not cognitive abilities as compared to white children. Jensen's associative-cognitive dimension can be characterized in terms of the relative amount of self-initiated activity required of the testee. That is, moving from associative to cognitive tasks, the testee must spontaneously produce more covert mental activities such as deduction, induction, verbal mediation, and hypothesis testing, in order to perform successfully.

Paired-associate learning tasks lend themselves well to measuring cognitive abilities. Previous research has shown that the paired-associate learning of young children and mentally retarded adults is greatly facilitated by some form of verbal mediational process (Jensen, 1962; Jensen & Rohwer, 1963a, 1963b, 1965, 1968; Rohwer, 1966). Jensen has suggested that individual differences in children's threshold for spontaneous verbal mediation appears to be correlated with age, intelligence, and social class and argues that future research should focus on determining the degree to which individuals from different social classes differ in the kinds of verbal mediators they bring to the learning situation. Jensen (1968b) has described "syntactical mediation" as one of the most powerful variables affecting the speed of paired-associate learning. That is when the pairs of items are presented in the context of some kind of syntactical structure, such as a meaningful sentence, the association is made almost at once.

The principle objective of the present investigation is concerned with an examination of the verbal mediation tendencies which are brought to the learning situation by groups of predominately lower class Negro and white first graders, as well as an examination of the effects of three types of pretraining in syntactical verbal mediation on the subsequent paired-associate learning of these two groups.

The hypotheses of the present study are as follows:

> 1. It is expected that since performance on a paired-associate task is largely dependent on the richness of the individual's early verbal experience, white first graders will have higher scores (in terms of total number of correct responses) on paired-associate tasks involving no mediation instructions than will lower class Negro first graders.
>
> 2. Both Negro and white first graders will show increased performance on a paired-associate task under conditions of "induced mediation" (subjects asked to make up sentences with pairs of nouns) and under conditions of "mediation" (subjects given short but complete sentence using the noun pairs) as compared to the groups receiving no mediation instructions.
>
> 3. While it is assumed that Negro children are relatively deficient in ability to produce effective mediators (even when instructed to do so), it is expected that Negro performance on the paired-associate task under the "mediation" conditions will not differ significantly from that of whites. In other words, providing subjects with an effective mediator should erase any ethnic group differences.

The above three hypotheses are based on comparisons of the two groups of first graders on the initial pretraining trials under the three conditions (mediation, induced mediation, and no mediation). In addition, the followng hypotheses are based on comparisons of the two groups' performances on a subsequent paired-associate task involving no mediation instructions. Thus these hypotheses are based on four comparison groups; Negro vs. white under pretraining with two lists accompanied by mediation and induced mediation instructions respectively, pretraining with one list accompanied by mediation instructions, pretraining with one list accompanied by induced mediation instructions, and the control group given just the subsequent paired-associate list with no pretraining.

> 4. Based on these comparisons, it is expected that all three pretraining conditions (mediation plus induced mediation, mediation alone, and induced mediation alone) will result in increased performance on a subsequent pared-associate task for Negro and white groups as compared to the control group.
>
> 5. It is expected that pretraining with lists involving mediation instructions (mediation plus induced mediation and mediation alone) will result in similar (not significantly different) performances on a subsequent paired-associate task involving no mediation instructions for both Negro and white

> groups, while pretraining with the induced mediation only will result in significantly different performances on a subsequent paired-associate task (involving no mediation instructions) for the Negro and white groups.

Thus, hypotheses 4 and 5 state that pretraining invovling mediation should erase Negro-white differences on a subsequent paired-associate task.

METHOD AND PROCEDURE

Subjects

Eighty *Ss*, 40 white and 40 Negro with equal numbers of males and females in each group, were selected from the first grade classes of two public elementary schools in Jackson and Chatham county, Georgia. Both schools serve rural, working class communities. The age range for both Negro and white *S*s was 77 to 102 months, with a mean of 85.8 for the Negro *S*s and a mean of 85.7 for the white *S*s. Ten *S*s from each population were randomly assigned to the four experimental groups.

Design and materials

The variables of "race" (Negro vs. white), groups (4 experimental conditions), and trials (5) were combined in a three-factor mixed design, with repeated measures on one factor (trials).

Three paired associate lists consisting of 10 pairs each were constructed from a set of colored pictures of common nouns commercially available. With one exception (spoon) the nouns were rated AA or A in the Thorndike-Lorge frequency ratings. These pictures were photographed onto colored transparencies in pairs which suggested simple but complete declaratory sentences. A complete list of the materials used appears in Table 1. A slide projector with automatic slide advance was used to present the materials. A pilot study had shown that the three lists were roughly equivalent in terms of ease of learning for Negro and white first graders.

Procedure

The paired-associate tasks were administered to each *S* individually using the standard anticipation method. Testing conditions were kept relatively uniform in that *Ss* were tested in a quiet, semi-darkened room set apart from the other classrooms.

Experimental condition 1 consisted of pretraining each *S* in this group first on a list with mediating sentences provided by *E*, followed by pretraining on a list with instructions to use mediators (make up sentences), followed by presentation of a third list with no instructions. Experimental condition 2 consisted of pretraining with on list under "mediation" instructions (*S*s provided mediating sentences by *E*), followed by presentation of a second list under no mediation instructions. Experimental condition 3 consisted of pretraining with one

Table 1

Word Lists and Sentences

Picture Pairs	Sentences (when used)
List 1:	
1. LAMP-STAIRS	The LAMP fell down the STAIRS
2. HORSE-LOG	The HORSE tripped over the LOG
3. MATCHES-PENCIL	The MATCHES burned the PENCIL
4. BROOM-NAIL	The BROOM swept the NAIL
5. CAR-HAT	The CAR ran over the HAT
6. CLOCK-WAGON	The CLOCK rode in the WAGON
7. COW-WHISTLE	The COW blew the WHISTLE
8. HAND-DRUM	The HAND played the DRUM
9. BIRD-WINDOW	The BIRD flew in the WINDOW
10. FISH-KEY	The FISH swallowed the KEY
List 2:	
1. SPOON-NEST	The SPOON fell out of the NEST
2. CAKE-TRUCK	The CAKE rode in the TRUCK
3. CAT-SWING	The CAT played on the SWING
4. TIE-BRUSH	The TIE was wrapped around the BRUSH
5. TIRE-CLOWN	The TIRE ran over the CLOWN
6. PLIERS-BELT	The PLIERS squeezed the BELT
7. SHOE-CHAIR	The SHOE was under the CHAIR
8. COMB-CUP	The COMB was in the CUP
9. FIRE-TREE	The FIRE burned the TREE
10. LION-PIPE	The LION smoked the PIPE
List 3:	
1. SKATE-SPIDER	The SKATE ran over the SPIDER
2. RING-TENT	The RING was lost in the TENT
3. MAN-ROPE	The MAN tied the ROPE
4. SCISSORS-LEAF	The SCISSORS cut the LEAF
5. HAMMER-WATCH	The HAMMER smashed the WATCH
6. SOCK-GATE	The SOCK was hung on the GATE
7. RULER-BOX	The RULER measured the BOX
8. KITE-BUS	The KITE flew over the BUS
9. FLAG-BASKET	The FLAG was stuck in the BASKET
10. PUPPY-BELL	The PUPPY rang the BELL

list under "induced mediation" instructions (sentences made up by *S*), followed by a second list under no mediation instructions. Experimental condition 4 consisted of presentation of one list under no instructions to mediated.

The initial exposure to each list under all conditions consisted of presentation of each stimulus and response pair separately and having each *S* name it, followed immediately by presentation of the nouns in pairs. The initial exposure to the pairs for all lists was kept roughly equivalent at about 12 seconds. During the testing trials, the stimulus pictures appeared for 6 seconds and was followed immediately by the slide showing both the stimulus and response pictures for 6 seconds. This procedure was repeated for each list for five trials or one errorless trial, whichever came first.

RESULTS AND DISCUSSION

Two analyses of variance were performed on the data. The first analysis of variance involved performance on the final or "transfer" list (the only list under condition 4) of each of the four conditions; that is the list *not* accompanied by instructions to use mediators. In addition, a 3 x 2 analysis of variance was carried out using *initial* performance of the two groups under each of the three treatments: Mediation, induced mediation, and no mediation. Raw data used in the analyses were total number of correct responses for each trial (with a square root transformation) in the first analysis, and mean number of correct responses over all five trials (without transformation) in the second analysis.

The summary table of the first analysis of variance appears in Table 2. The most surprising finding is the lack of significance of the main effect for "race". However, individual comparisons of means using Duncan's Multiple Range Test (see Table 3) reveal that white first graders were superior to Negro first graders under conditions of no mediation, and induced mediation ($p < .05$ and $p < .01$ respectively), but not under conditions of mediation and mediation plus induced mediation (Experimental conditions 2 and 1 respectively). These data are depicted graphically in Figure 1.

Thus hypotheses 4 and 5 are supported. That is, pretraining involving explicit instructions to use mediators tended to erase Negro-

Table 2

Analysis of Variance: Final List

Source	df	MS	F
Between Subjects	79		
Treatments (B)	3	1.01	5.49*
Race (C)	1	2.37	3.25
B x C	3	.30	1
Error	72	.73	
Within Subjects	320		
Trials (A)	4	[illegible]	366.00**
A x B	12	[illegible]	7.33**
A x C	4	.03	1.00
A x B x C	12	.04	1.33
Error	288	.03	
Total	399		

* $p < .05$
** $p < .001$

Table 5
Duncan's Multiple Range Comparisons of Mean Number Correct Responses Across All Five Trials For "Race" Effects

	16.60	16.91	17.66	18.19	18.30	18.32	19.06	19.76
A 16.60		.32	1.06	1.59	1.70	1.72	2.46	3.16
B 16.91			.75	1.28	1.39	1.41	2.15	2.85
C 17.66				.53	.64	.66	1.40	2.10
D 18.19					.11	.13	.87	1.57
E 18.30						.02	.76	1.46
F 18.32							.74	1.44
G 19.06								.70
H 19.76								

	.05	.01	.001
Where A = Negro-condition 4	.88	1.15	1.46
B = Negro-condition 3	.87	1.14	1.45
C = White-condition 4	.86	1.13	1.44
D = White-condition 3	.85	1.11	1.42
E = Negro-condition 2	.83	1.09	1.40
F = White-condition 2	.80	1.06	1.37
G = Negro-condition 1	.76	1.02	1.32
H = White-condition 1			

H > A ($p < .001$)
H > B ($p < .001$)
H > C ($p < .001$)
H > D ($p < .001$)
H > E ($p < .001$)
H > F ($p < .001$)
H = G
G > A ($p < .001$)
G > B ($p < .001$)
G > C ($p < .01$)
G > D ($p < .05$)

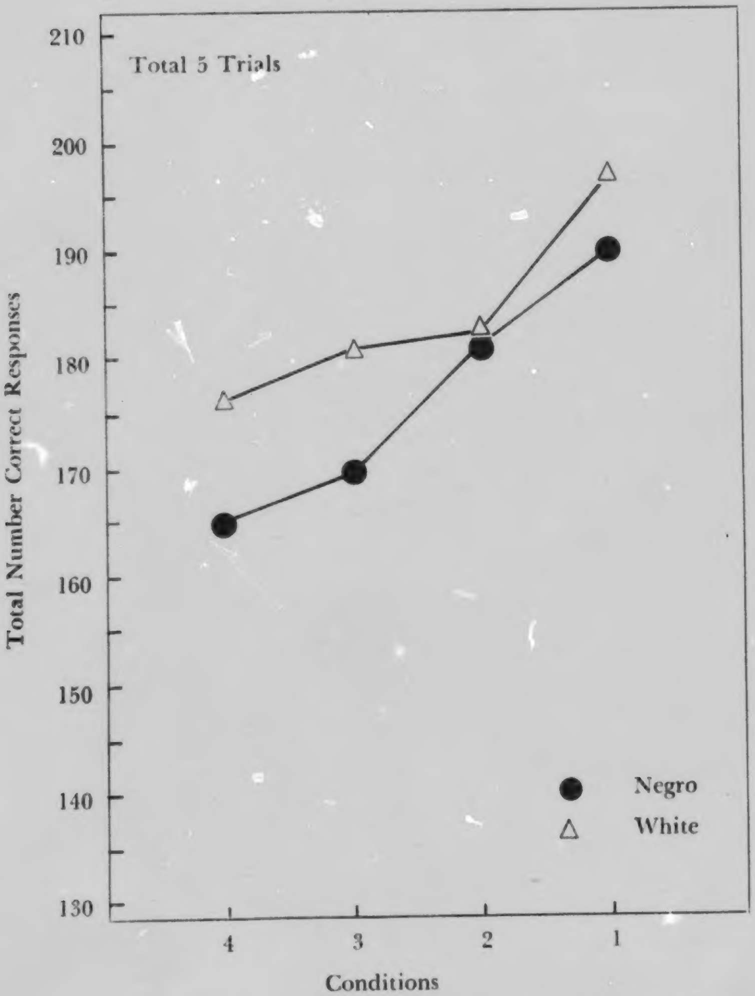
G = E
G = F
F > A ($p < .001$)
F > B ($p < .01$)
F = C
F = D
F = E
E > A ($p < .001$)
E > B ($p < .01$)
E = C
E = D

D > A ($p < .001$)
D > B ($p < .01$)
D = C
C > A ($p < .05$)
C = B
B = A

white differences on a subsequent paired-associate task with no instructions to use mediators.

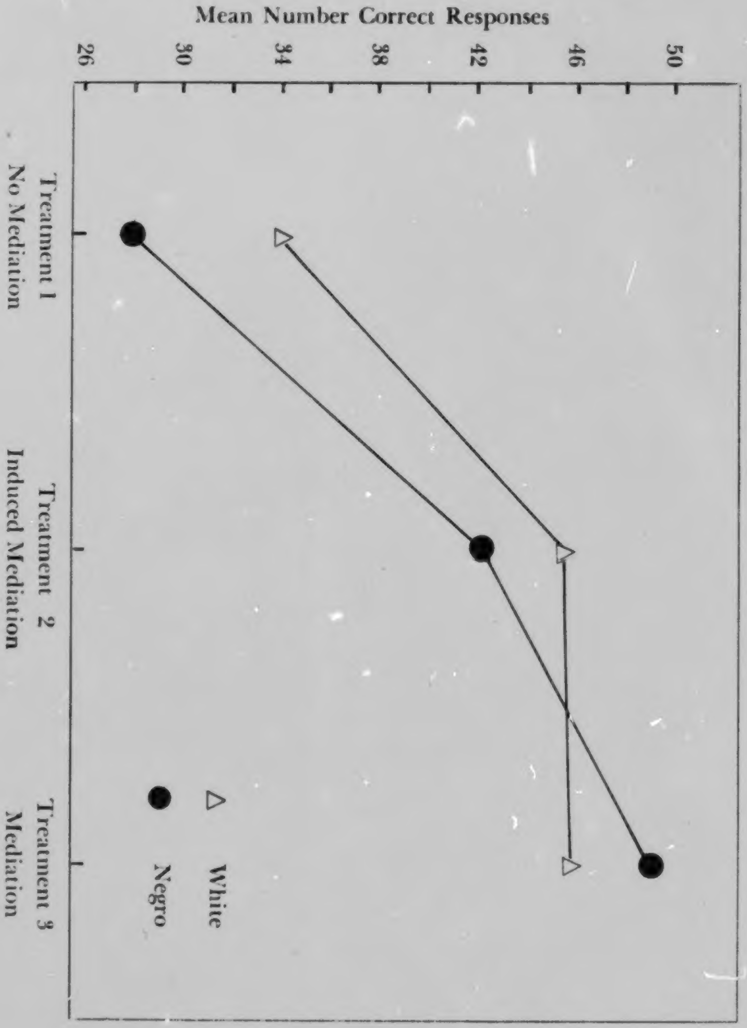
The summary table of the second analysis of variance (2 x 3—"race x treatments") appears in Table 4. Again, the surprising finding is the non-significant main effect for "race". Individual "race" comparisons of means also revealed no significant differences. However, individual comparisons of combined Negro and white groups, as in the first analysis, revealed that provision of explicit mediators as well as instructions to make up mediators significantly increased the number of

Figure 1. Correct Responses Under Four Conditions



Thus the first hypothesis: that whites would be superior to Negroes correct responses on the paired-associate lists as compared to the groups receiving no mediation instructions. These data are plotted in Figure 2. As can be seen in Figure 2, Negroes were slightly but not significantly superior to whites under treatment 3 (*S*s given mediators by *E*).

Figure 2. Correct Responses under three Treatments.



under treatments involving no mediation instructions is not supported. while the second hypothesis; that both Negro and white groups would perform significantly better under treatments involving mediation and induced mediation is supported.

Table 4
Analysis of Variance: Initial List

Source	df	MS	F
Race	1	74.82	1.38
Treatments	2	1564.80	28.75*
Treatments x Race	2	92.47	1.70
Error	54	54.43	
Total	59		

$p < .001$

The finding that pretraining under mediation instructions facilitates subsequent performance has significant educational implications. The data from this study suggest that predominately lower class Negro first graders are deficient in the ability to spontaneously produce effective mediators, but given their production, these children are not deficient in the ability to use them. These results are consistent with those of Elkind and Deblinger (1969), Osborn (1968), and Corsini (1969, 1970).

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SOME IMPLICATIONS FROM PAIRED ASSOCIATE LEARNING ON THE DEVELOPMENT OF READING READINESS

Although the original purpose of this study (Mustico, 1968) was to investigate some of the relationships which might exist among learning, intelligence, and pre-requisite achievement, both the conclusions of the study itself and those of the literature reviewed in the process, have generalizations which extend into the area of reading readiness. Dechant has pointed out that, "Learning almost universally involves an association of the unknown with the known [1964, p.171]." He further states, "Meaning can be associated with the printed word only by associating the word with an experience . . . [p.172]."

The quantity and quality of experiences which are relevant, if not absolutely pre-requisite, to learning to read must be what is commonly referred to as reading readiness. In other words reading, as any other learning task, requires a background of pre-requisite learnings before the accomplishment of the desired learning task can be achieved. The purpose of the following study was to investigate the relationship between learning in the Paired-Associate (PA) task and measured intelligence, as opposed to the relationship between PA learning and associative meaningfulness. Additional variables of age and SES were also considered. The theoretical position from which the hypotheses of this study were generated is that the basic determiner of rate of learning for a given task is the amount of task relevant achievement brought to the learning situation.

This position suggests that prediction of learning rate (achievement in a fixed time learning situation) by means of intelligence tests occurs because IQ scores reflect a general level of achievement. In reflecting achievement in general, these scores tend to reflect achievements which are specific or prerquisite to a given learning task. In light of this, the study was directed toward an examination of an operationally defined specific achievement (production meaningfulness) which is considered to be indicative of the response learning phase of the PA task and thus prerequisite to the associative learning phase of the task. If indeed the variable of meaningfulness is prerequisite or readiness for the PA task it would be a better predictor of success in PA learning than would IQ.

HYPOTHESES

If IQ scores and meaningfulness represent measures of general and specific achievements respectively, then there should be a tendency for an increase in general achievement to be accompanied by an increase in the specific achievement. This expectation was expressed as Hypothesis I: There is a positive relationship between the measured intelligence of subjects and the total meaningfulness of verbal materials to subjects.

If meaningfulness is defined as a construct which is measured by the number of associations available to a stimulus then the source of meaningfulness must lie in the development of associations. Following S-R theories associations are formed by contiguity in time and strengthened by repeated exposure. Underlying meaningfulness, then, must be some function of frequency in the environment. Aspects of frequency have been investigated by Noble (1953), Gannon and Noble (1961), Underwood and Schulz (1960), Johnson (1962) and DiMascio (1959) with the notion that components of high meaningful materials occur with greater frequency in the environment in general than do the components of low meaningful materials. But by selecting groups which have had varying restrictions in environmental exposure (opportunity for prior learning) because of age or SES, it becomes possible to examine the position that meaningfulness can be interpreted as prior learning. Hypotheses II and III were framed as follows: There is a positive relationship between age of subjects and the total meaningfulness of verbal materials to subjects; and there is a relationship between the rating of the environment of subjects and the total meaningfulness of verbal materials to subjects.

The hypothesized relationship between IQ scores and meaningfulness scores expressed in Hypothesis I predicted a tendency for higher IQ subjects to indicate through associations that the materials used in this study are more meaningful to them than they are to low IQ subjects. If the learning rates of the IQ groups were the same and the relationship between meaningfulness and learning was linear, parallel slopes would be expected when the learning of the two groups was compared across levels of increasing meaningfulness. The relationship between meaningfulness and intelligence was expected to be sigmoidal rather than linear. If two identical sigmoid curves are separated by displacing one on the abscissa, the relationship between the two becomes one where the two curves are closest at extreme positions on the abscissa. This lead to the expectation that mean differences in learning scores of the high and low IQ groups would be greatest at mid-range of meaningfulness and least at extremes. These notions were expressed as Hypothesis IV: As the average maningfulness values of learning materials increases, the mean difference in learning scores for different intelligence levels will first increase then decrease.

METHODS AND PROCEDURES

The verbal materials used in the learning task were three letter combinations (trigrams) in the forms of consonant, vowel, consonant (CVC) and three consonants (CCC). Initially a set of 80 trigrams were selected from previous lists developed by Witmer (1935) and Noble (1961) so as to cover a wide range of meaningfulness. These initial trigrams were presented to subjects at each of five educational levels (approximately 80 at each level), in order to determine actual mean number of associations (meaningfulness values) to each of the trigrams for the subjects involved in the study. On the basis of the means and standard deviations of the number of associations of subjects, six trigrams were selected at each of four meaningfulness levels. These trigrams were then randomly paired with a two-digit stimulus number and randomly assigned to one of three learning lists with the condition that two trigrams from each level appear on each list. These lists were presented to subjects in partially counterbalanced orders as paired-associate learning tasks. Each list was presented ten times, one pair at a time (two second exposure, one second interspace), and measurements of learning were taken between each complete presentation of a list (eight pairs). In order for a subject to be credited with learning, he had to write the appropriate trigram when presented with the stimulus number. Maximum learning score was 240 (3 lists x 8 members x 10 presentations).

THE SAMPLE

The original population from which the sample was drawn consisted of college sophomores enrolled in an introductory course in Educational Psychology at the State University of New York at Albany and all members of grades 3, 6, 9, and 12 in attendance at the schools of Central School Dsitrict No. 1, Towns of Sand Lake and Poestenkill (Rennselaer County, New York). Selections of classrooms at the noncollege level were made randomly unless subjects were grouped homogeneously on an intelligence variable.

Subjects for the final sample were selected on the basis of whether or not data was available from the association task, the learning task, intelligence testing, and school records (age and father's occupation used in the determination of SES). High and low intelligence groups were selected as the upper and lower 20 scores at each of the five grade levels. The final sample was composed of 292 subjects on whom complete data was available. Of the 292 subjects, there were 55 college sophomores, 60 12th-graders, 60 9th-graders, 57 6th-graders, and 60 3rd-graders. The first three hypotheses were tested using data from 292 final subjects; Hypothesis IV was tested using data based on 20 subjects (the highest and lowest 20 scores on the IQ variable at each of five grade levels).

RESULTS*

The following data were collected from each subject: score on IQ test (Otis Alpha, Beta, Gamma, or CTMM); rating of socio-economic status (SES) ; number of associations to each of 80 trigrams (m); total number of associations to trigrams (M); total m for trigrams used at four learning levels (m_1, m_2, m_3, m_4); learning scores for materials at four learning levels.

Hypothesis I was supported. A significant Partial r (IQ x M.CA, .38, $p < .001$) was found between intelligence test scores and the total number of associations produced by subjects to the 80 initial trigrams submitted to them.

Hypothesis II was supported. A significant Pearson r (.70, $p < .001$) was found between age of subjects and the total number of associations they produced to the initial 80 trigrams.

Hypothesis III was supported. A significant Spearman's Rho (—.17, $p < .01$) was found between ratings of socio-economic status of subjects and the total number of associations they produced to the 80 trigrams. The negative sign of the coefficient is due to the assignment of low ranks to upper SES categories by the Edward's (1937) scale.

Hypothesis IV was supported in part. The predicted decrease in the relationship between IQ and learning was found between meaningfulness level 3 (.43, $N = 292$) and level 4 (.25, $N = 292$). This decrease was tested using Totaling's *t* for correlated correlations and found to be a significant difference ($p < .001$). Table 1 is a presentation of the differences in meaning learning scores (number of correct responses) for high and low intelligence subjects at five grade levels for four levels of meaningfulness. The tendency for mean differences in learning scores to decrease as meaningfulness increases from level 3 to 4 can be seen at all grade levels. A tendency for a decrease in mean learning scores as meaningfulness decreases from level 2 to level 1 is not substantially evident at any grade. The supposition that mean differences in learning scores at the mid-range of meaningfulness values would be significantly different from no difference at the .05 level was supported in eight of the ten cases.

Table 1

Mean Differences in Learning Scores at Four Levels of Meaningfulness for High Versus Low IQ Groups

Grade	Meaningfulness level 1	2	3	4
14	5.35*	5.95*	3.75	2.75
12	15.20*	13.50*	7.00*	5.65*
9	15.70*	18.90*	12.15*	3.45
6	11.30*	11.95*	14.50*	6.75*
3	.40	.55	5.45*	3.15

* $p < .05$ (One tail)

Confirmation of Hypothesis II indicates that the trigrams used in the learning task tended to be more meaningful for the older subjects. Thus the most meaningful learning materials tended to be the CVC trigrams learned by the college sophomores and the lowest meaningful materials tended to be the CCC trigrams learned by the third graders.

Differences in mean learning scores of high and low IQ groups fail to be significantly different ($p < .05$) for sophomores learning the CVC materials and 3rd graders learning the CCC materials. This difference was examined after finding a significant triple interaction (M x IQ x Grade).

The relationship between the meaningfulness of materials used in the PA task and the learning scores produced can easily be overlooked by the use of either single part scores or the total score. This occurs because the correlations between meaningfulness scores and the learning scores at each of the four levels of the PA task when taken by grade level fail to be sensitive to the differences in learning which occur between meaningfulness levels (the within subject variation due to differences in learning materials). Total scores (LT) for all four subsections of the PA task and total meaningfulness of material learned (m_t) when correlated with IQ also fail to demonstrate that the IQ is insensitive to the within subject variation across learning levels. When scores of this latter nature are used, only the total sample description yields a high r between learning scores and the associative fluency of subjects. These relationships between m_t, IQ, and LT at each grade level are presented in Table 2. This table is based on the data from the High-Low IQ sample of 200 subjects, 40 at each of the five grade levels.

Table 2

Correlations Among IQ, Associative Fluency, and Total PA Learning at Each of Five Grade Levels (N = 40 per grade)

Grade	r		
	IQ x m_1	IQ x LT	LT x m_1
14	159	.467	.220
12	.280	.614	.295
9	.287	.789	.217
6	.476	.601	.289
3	.424	.155	.445
Total	.397	.478	.660

On the other hand when the number of associations (m_1, m_2, m_3, m_4) elicited to each of the four groups of six trigrams for each of the 40 subjects at five grade levels well pooled and correlated, strong correlations between associations and learning occur consistently both within and across grade levels. The insensitivity of IQ to the within learning differences now results in a marked lowering of the relationship between IQ and learning (LS) at each of the grade levels. The df associated with the correlations presented in Table 3 have increased because they are based on four association and four learning scores for each subject.

Table 3

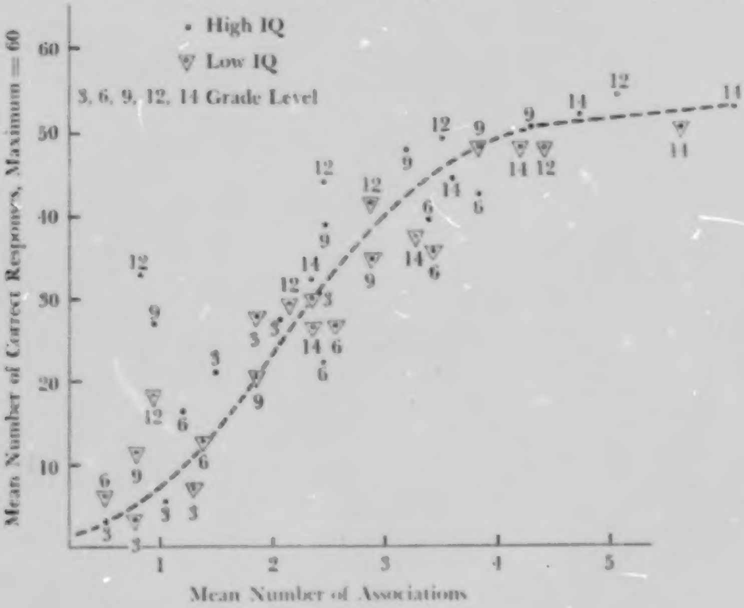
Correlations Among IQ, Association Scores, and Learning Scores Combined Across Learning Materials at Each of Five Grade Levels (N = 40 per grade)

Grade	r		
	IQ x ASN	IQ x LS	LS x ASN
14	.078	.251	.610
12	.107	.376	.652
9	.135	.468	.666
6	.286	.324	.616
3	.243	.068	.683
Total	.349	.264	.710

The graphical information presented in Figure 1 seems to indicate that the average number of associations produced to the trigrams (response members of PA tasks) prior to the learning tasks accounts for more of the variance in mean learning scores than does measured IQ.

It can be seen in this figure that a mean of approximately 2.5 associations was produced by High IQ G_{14} (level 1), Low IQ G_6 (level 3), Low IQ G_{14} (level 1 and Low IQ G_3 (level 4). The mean learning score of the 2 former groups was approximately 30 and that of the 2 latter groups was approximately 25.

Figure 1. Mean learning scores of high and low IQ groups from each of five grade levels, for six trigrams at each of four meaningfulness levels, as a function of the number of associations elicited from members of each group.



IMPLICATIONS FOR READING READINESS

Inasmuch as reading is, in its initial stages, an associative process, the attention that is paid to the formation of associations in the development of reading readiness is well justified. Emphasis should be placed on broadening the associations of the child, so that the sight and sound of letters and words become more meaningful. Although simple elicitation of associations has typically not been considered to constitute meaning in the sense of a concept, research by Jenkins and Russell (1956) has shown a high degree of correlation to exist between the number of associations produced to a stimulus and the displace ment of that stimulus from the neutral point in the semantic differential.

Meaningfulness is related to various measures of environmental occurrance. Lack of environmental experience with letters, numbers, and words must be compensated for in the process of developing reading readiness. Research by DiMascio (1959) has shown that, even with readers, the ability to recall a syllable is related to the frequency of occurrance of the letters of the syllable in the written language. The following conclusions seem warranted.

Associations to the individual letters as the initial letters of words and objects in the environmental experience of pre-readers probably cannot be over emphasized in the process of developing associative meaningfulness for the letters themselves.

Utilization of words which are emotional charged should occur, to take advantage of the broader associate network or meaningfulness that are characteristic of these words.

Even the direct teaching of random associations to nonsense syllables enhances the learning of this nonsense, and perhaps for many pre-readers letters and words are nonsense.

Paired associate research indicates that pronounceability of nonsense is associated with learning in the PA task. Associations to phonic elements in words which are taught for the purpose of sounding out a word should be formed to a wide variety of words which occur in the environmental experience of the pre-reader.

The initial reading vocabulary should be closely associated with the common speaking vocabulary of the child in that initial reading is a strengthening of associations between the written word and the spoken word.

Although scores on IQ tests are related to associative fluency in general, that associations play a greater role in PA learning than does IQ. Initial reading at least is very much like the paired associate task.

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SYSTEM-WORD ASSOCIATIONS OF DEPRIVED CHILDREN

The study was concerned with the response associations to one hundred structural and lexical words selected from Coleman's (1968) learnability list. The purpose of the study was to extend to a different cultural population an investigation previously done by Doak (1969). The population chosen by Doak for investigation of the responses to this list of words represented five- and six-year old kindergarten children who were defined indirectly as average, middle-class and achievement-oriented. To supplement Doak's data, the present study extended this population to include the range of students who could be defined as economically poor, culturally disadvantaged, and academically deprived. An encompassing question posed by the present investigation centered around whether responses elicited from the Doak population were quantitatively and qualitatively generalizable to a population which was quite dissimilar; that is, would responses to a list of stimulus words be as much a function of the words as of the population providing the responses.

It would be expected that subjects with similar backgrounds environmentally, educationally, and culturally would give similar responses to the various stimulus words. It would be further expected that the amount of information transmitted as well as the quality of information transmitted would be more likely homogeneous within a subset of a cultural than across subsets of the same culture. The degree to which this simliarity occurs within a specified population of people and responses has been labeled commonality. Complete commonality would imply that all subjects would produce the same responses to the same set of stimulus words. Since the informational quality of words varies, and since people themselves tend to be heterogeneous, the degree of commonality expected from a stimulus word would be licitly expected to vary from time to time and sample to sample.

For purposes of this study, *lexical* words were defined as nouns, main verbs as opposed to auxiliary verbs, and adjectives. These words are concrete representations or abstractions which can be categorized into lexical form classes. *Structural* words were defined as all words other than lexical words which form a union with the lexical thus giving meaningful interpretation to the lexical words and which when used in conjunction with lexical words provide meaning to the language. Further, the word *deprived* as used in this study was defined in an *ad hoc* fashion. For this study all subjects selected were children whose families were categorized by local social agencies as living at a poverty level economically. Many were in poor health, their parents were often on welfare, the provision of financial and parental support was unstable at best.

FOCUS OF INVESTIGATION

The foci of the investigation were directed in three channels: commonalities of responses to structural and lexical words; sex differences and the commonality of associations to structural and lexical words; and the commonality of the associations relative to the learnability of words.

The set of common responses have been classified into four categories: syntactical, paradigmatic, phonological, and indeterminate. Some explanation of these terms is in order since they have a specific meaning to this study. Traditionally, syntactical responses have been linguistic conventions with particular examples being specific to a language or to a subset of a language. As used in this investigation, a syntactic response was considered as any response which logically followed from the syntactic structure of the language and which provided a complete thought or provided closure for a stimulus word. Although the subjects involved in this study were five years of age, the responses which were given were subject to categorization consistent with adult logic. Thus, any common response would seem linguistically sequential was classified as a syntactic response.

Those common responses which were of the same form class, as a stimulus word which could be meaningfully or logically substituted for the stimulus word were classified as paradigmatic. Synonyms, antonyms, and words of the same grammatical class fell in this category. All responses that were classified as paradigmatic also exhibited one of the following relationships: superordinate, co-ordinate, part-whole, or contrast. Examples of paradigmatic responses would be: Response word *brother* to stimulus word *sister, lady* for *girl*, or *what* for *when*.

A phonological response was one which was primarily homonymic or phonically related to the stimulus word. Generally, these are words which could not be legitimately classified as paradigmatic or syntactic. Examples of phonological responses would be *bemember* for the stimulus word *remember,* and *mouse* for *house.*

The last category labeled indeterminate included all common responses not readily or meaningfully classifiable as syntactical, paradigmatic or phonological. Perceptual cues presumably stimulated by a lack of ready response to the stimulus words were relegated to this category. The inclusion of a category of this nature was deemed necessary because of the general reduction in verbal facility which seemed an apparent concomitant of cultural deprivation. Examples of indeterminate responses would be such responses as *bookcase,* or *chair* to stimulus words which have no apparent logical, syntactical, or phonological relationship to the stimulus words.

Since the commonality of response could have been a function of the structure of the stimulus word as much as the qualitative organization of the word, a further focus of the study was to investigate the commonalities of both the structural and lexical words relative to the number of letters in the stimulus word, the number of phonemes and the number of syllables.

PROCEDURES

All subjects were five years of age and were labeled deprived according to the definition given earlier. The social economic level could be considered among the lower third in the United States. Forty boys and forty girls were randomly chosen from the students at the Chenango Forks (New York) School System who met the criteria for deprivation. All subjects were white, native-speaking American.

STIMULUS WORDS

Fifty lexical and fifty structural words were chosen from the list of words developed by Coleman. For this study the words were not randomly selected but were rather a replication of the selection of words utilized by Doak (1969). Doak chose three words from each level except for the two levels which contained less than three words. The fifty lexical and fifty structural words were originally chosen so as to most nearly correspond to the error level suggested by Coleman.

METHOD

The one hundred stimulus words were divided into four presentation groups. The method of selection of each word and its appropriate group is described by Doak (1969). Twenty-five words, both lexical and structural, appeared in each group. Four groups of subjects were defined with ten boys and ten girls randomly assigned from the population described. A division of the stimulus words into four groups and the restriction of words presented to twenty-five words per subject was done for purposes of facilitation of administration. With each subject assigned to one group and each group limited to twenty-five words, no subject was required to respond to more than those twenty-five words to which he was assigned. Since all the subjects were beginning kindergarten children, none could read or write. Thus, all words were presented orally and individually. The purpose of this inquiry was to replicate a previous study on a different population, and so the problem presented by the homonymic words was not controlled, nor were the problems presented by pseudo-homonyms. The impact of heterogeneous noncontrollable factors such as environmental cues, differing classrooms, and other sources of internal invalidity were minimized as much as possible by administering all tasks in the same relatively empty conference room provided for this purpose. The same examiner was used in all cases. The examiner was previously unknown to the subjects.

All responses given were recorded on a 3 x 5 index card with one stimulus word and the twenty responses recorded on the card. For bookkeeping purposes the informational statistic obtained by Doak and the informational statistic obtained in the present study were recorded on this card.

ANALYSIS OF DATA

In the main, the data obtained in this study were presented descriptively. When analyses were performed, the informational theory logarithmic transformational statistics were employed. The informational content of each stimulus word was obtained by using the transformation suggested by Attneave (1959). The basic statistic is labeled Hx and is nothing more than a measure of the variability of information in bits. Hx is maximal when there is no commonality in the response, that is, all responses are unique responses. Hx is minimal when all subjects make the same response to a stimulus word. The greater the number of bits produced by the stimulus word the more information the word conveys.

RESULTS AND CONCLUSIONS

Variability for stimulus words was found to be very high for this group of subjects indicating a low redundancy factor in the associations. This is reflected in the paucity of commonalities in responses and the subsequent number of unique responses offered. Commonalities of magnitude two accounted for nearly half of all common responses, and only about ¼ of all responses given were common; ¾ were unique. This result is directly the reverse of what Doak found. Doak's subjects, a more achievement-oriented group, produced about ¾ common responses and ¼ unique. This reversal is too dramatic to be ascribed to sample size or item selection. The more poignant argument suggests population differences of the nature which generated the study.

The investigation bore out the conclusion by Doak relative to sex differences in responses. Doak maintained that at the five-year old level no meaningful differences in commonality responses could be attributed to sex. This was also the finding of this study. Bickley (1969) in a study of learnability also concluded that no sex differences of any interpretable nature were manifest in small children. These conclusions, while congruent, appear to represent an unpopular minority in the literature of studies of young children.

A qualitative examination of responses produced some evidence that these subjects may be operating on an entirely different plane than more advantaged children. Clinical observation of the children in the act of responding produced some verification of the suggestion of Brown and Berko (1960) who speculated that word associations of young children would often appear illogical or irrelevant when the child does not have an association for the stimulus word. Clearly, one of the concomitants of deprivation is a reduced verbal facility. The expectation of a meaningful response from a subject whose language command is at best mediocre is in most euphemistyc terms, optimistic. Faced with a stimulus word for which the language experience had provided no ready associate, the subject would seek out a perceptual cue, some object in a testing room, as his response rather than disappoint the experimenter by offering no response. The effect of this environmental or perceptual cueing was to reduce potentiality for commonality, to increase the informational value of the stimulus word and to render the association less redundant, therefore, less learnable. While perceptual cueing is not to be deprecated, it may camouflage for the less perspicacious investigator the validity of the responses, in that the response is less to the stimulus word than to the anxiety generated by no response. To treat responses of this nature in the same manner as other responses may obfuscate rather than clarify their meaning.

Not surprisingly, the finding that the most prevalent common response was syntactical concurred with a similar finding in the Doak study. Apparently, degree of advantageness is irrelevant in this respect, making more generalizable the contentions of Ervin (1961) and Entwisle (1966). Phonological commonalities, however, appeared more often with the deprived group than with the advantaged. These responses indicate a potential lack of response or an attending to sound rather than meaning. Often the response was completely meaningless both in relation to the stimulus and relative to the language. The abundance of these responses was attributed to poor language facility and further bears out Brown and Berko's assertions that responses may be bizarre if associations have not been previously made.

Examination of the data also suggested the possible operation of an idiodynamic set. Often responses by subjects followed a discernible pattern independent of the stimulus word. For example, one subject responded with war material to many of the items; truck, jeep, tank, etc. Another responded with emotionally laden associations: hate, Mr. X. Clearly the latter subject was responding to a current problem rather than to the stimuli; the former catalogued his responses. This type of response did not seem to appear in Doak's study and is not reported there. The assumption is that the responses are idiosyncratic; the induction is that the idiosyncratic responses are concomitants of linguistic associational deprivation and may be more a function of the deprived population than of the advantaged.

A real weakness of the study was exposed by responses of the deprived child. Since none could read, all were presented the stimuli orally. Because of their lack of verbal discrimination, phonology became a factor. Subjects on occasion seemed to mistake words like *which* for *witch, president* for *present*. Remediation of this problem required both a different mode of presentation and the ability of these subjects to respond validly to the altered mode. Perhaps this problem could be handled by using only concrete lexical words or by utilizing two sensory modes within one. In any case, the responses would be altered interpretively, and then they may lose their linguistic relevance to some psychological relevance.

The finding that monosyllables produced more common responses than polysyllables is congruent with what Doak found. Apparently, young respondents are less keyed to the length of the stimulus than to the number of syllables. Considering the building block process of language, this should come as a great shock.

IMPLICATIONS FOR EDUCATION

One task of the educator of young children is to build vocabulary in such a way as to make that vocabulary meaningful for communication. Evidence is given in this study which suggests that syntactical commonalities are more common than paradigmatic. We may be more successful in useful verbifacture if we concentrate on syntactical approaches rather than on language model associations. Piaget (1926) gave us the clue for this when he discussed the retention of mental images. He maintained that associations that are most proximal to the stimulus are those that are retained. In language, at least as it is spoken, experiences with words puts association in a syntax structure. Children learn from experience; language experience is greatly reliant on syntax; Syntax then provides the association. This obviously changes with increased experience, but a least in the early stages, syntactical associations render the language redundant, therefore usable.

There seems to be an inverse relationship between the number of syllables in a word and its redundancy. The longer the word in syllables, the more information the word carries, the harder it is to master. Perhaps some tie could be made between syntax and syllable length in the quest to make language meaningful.

An unfortunate reminder of the human condition and a weakness of purely quantitative analysis of this condition comes from the responses given by the deprived subjects when compared to advantaged same-aged subjects. While each group found the words to be essentially the same with regard to informational value, the actual responses were far different indicating that the words may mean entirely different things for different social levels. If so, the different levels are learning different things from the same words. Implications for concept building are frightening, but more ominous are the potential schisms that such variations can cause to a populace already sickly divided. An especial caution to the educator concerned the misreading of responses or associations of children. These deprived boys and girls go through the motions of learning, they feign meaningfulness long before meaningful associations appear. One is easily fooled by the visage of comprehension which masks an associational void.

One useful clue to teaching deprived children was given by their reliance on perceptual cues when associations were not available. With highly experienced children mental images can generate verbal associations. With deprived children whose experience with language in the environment is limited the need for consensual validation in association formation is underscored. These children do not have the cognotive storehouse to generate a multitude of mental images. They must be given the perception to make the tie.

A final observation which may have use for the educator hinges on the prevalence of the idiodynamic set in deprived children associations. The existence of this set should operate as a bellweather to cue the teacher that the child is making immature associations and probably does not have a meaningful concept to associate with the stimulus. In Doak's study the set was not mentioned. The assumption is that either it did not appear or it was not immediately obvious. Whether this is a function of class differences is debatable. In any case the presence of this type of response should be a cue to linguistic poverty which may eventually show up as a reading handicap.

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EFFECTS OF MODALITY ON RESPONSE IN WORD ASSOCIATION TASKS

In the psychological literature there are numerous studies using word association tasks. However, these studies seem to take little note of the possible consequences to responses that may be related to the method of presentation of the stimulus words. This study is directed toward the examination of the effects of the mode of input of stimuli on the type or quality of output. Specifically, the concern is whether or not the production of paradigmatic responses is influenced by oral or visual presentation of stimulus words across several groups.

Forgus (1966) maintained that "the informational aspects of the stimuli impinge upon the various sense organs, which selectively transduce specific kinds of information." If this transduction process is occurring, varying the input modality should cause differentiation in responses. This idea would challenge to some degree the central processing concept wherein all stimuli are decoded and held to be nothing other than sensorily different forms of the same perception.

Forgus' approach suggests that impulses received visually differ from impulses received auditorially and may be acted upon differentially in a central processing system. If learning or cognition is the sum set of one's past experiences, and if one's experiences are made meaningful through association, then it should not seem unreasonable that associations to visual stimuli may be different from associations to auditory stimuli.

Berg (1955) maintained that mode of input is essentially an irrelevant factor, that information received to the brain is basically the same regardless of how it is received. Otto (1962, 1964, 1965) in his investigation into verbal and pictorial presentations of stimuli materials found that responses were qualitatively different when the materials were presented differently.

Reynolds, Palmatier and Ulmer (1969) in a study of responses of adult illiterate Ss found that the production of responses was unrelated to the mode of presentation of stimulus materials. In a sequel to that study, Reynolds and Palmatier (1969) found that the quality of the responses varied considerably as a function of presentation mode. They suggested a rationale to explain this finding and suggested a paradigm for convergence of modalities from independence to dependence as S moved in the direction of becoming a master reader.

Some researchers (Deese, 1962; Ervin, 1957) suggest that the grammatical category of word presentation may have a bearing on the outcome. Deese found, for instance, that adverbs produced an overwhelming amount of syntagmatic responses while nouns produced a majority of paradigmatic responses. Ervin stated that adults made more paradigmatic responses while children gave more syntagmatic responses. Ervin (1961), Entwisle, Forsyth, and Muuss (1969) found that as the person gets older there is a tendency to produce more paradigmatic responses regardless of grammatical class.

The purpose of the present investigation is less to challenge previous research than to try to see whether the manner of presentation of stimulus words affected the response; that is, do more paradigmatic responses occur when the stimulus words are administered orally than when they are given visually (graphically). If so, then the studies cited above may deserve reconsideration, and these researchers may have overgeneralized observations which are more appropriately idiosyncratic to a sensory mode.

PROCEDURE

Four experiments were undertaken involving a total of 194 Ss of divergent backgrounds. Ss in Experiment 1 were 18 institutionalized emotionally disturbed adolescents. Experiment 2 involved 96 seventh and eighth grade boys and girls from one northeastern urban junior high school. Subjects for the third experiment were 40 southern rural third grade boys and girls. The fourth experiment replicated the third except that the same was drawn from a fifth grade population.

INSTRUMENT

A list of nineteen lexical words was established as the basis for the experimental task. All stimulus words were nouns, concrete words which were expected to elicit paradigmatic responses according to Deese (1962). All Ss had a reading command of these words. An addition to Deese's definition required that for any response to be clarified as paradigmatic it must meet one of the following relationships to the stimulus word: part-whole, substitute, superordinate-subordinate, or coordinate.

CRITERIA

All responses were written by each student. Each response was then dependently rated as to whether or not it was paradigmatic by two judges. Interrater reliability over all experiments was found to be highly satisfactory (average reliability = .96) when the total number of paradigmatic responses per individual was used as the basis of comparison.

TREATMENT CONDITIONS

Students were assigned in classrooms according to their treatment and condition. Only one modality was given to any particular student. In the oral treatment subjects were presented the stimuli by the tester aloud, repeated after five seconds and then requested to write down their first response. No admonition against multiple responses was given. In the visual treatment condition the presentation was the same except that all words were presented using an overhead projector with the stimulus words printed on transparencies.

RESULTS

In the first experiment the data were analyzed relative to sex, age, and I.Q. It was found that these three variables produced no differences; however, the major variable of concern, oral vs. visual presentation did yield significant differences. For both males and females more paradigmatic responses were produced in the oral presentation than in the visual presentation. The ratio of paradigmatic responses to oral presentations was nearly two to one over the visual. In the second experiment using the 96 seventh and eighth grade children, no significant differences between oral and visual presentation were found although here, too, there was a slight edge for the oral presentation. The third experiment produced significantly more paradigmatic responses in the oral presentation over the visual presentation. Although the difference here was not as dramatic as in the first experiment, the oral was clearly producing more mature responses for every stimulus word. The final experiment using the fifth grade subjects almost identically replicated the results of the third grade group. Again, there were significantly more paradigmatic responses in the oral presentation than in the visual presentation.

CONCLUSION

The results of these experiments indicated that the associations made by extremely divergent groups have a common thread running through them. In no group of the four tested did the visual presentation of stimuli produce as mature responses as did the oral presentation. This finding suggests verification of the results obtained by Reynolds and Palmatier (1969) and further indicates that the argument for tying associations to modalities may be tenable. If this is the case one of the clear responses of the researcher in reading is to further explore the effect of modality; one of the responsibilities of the teacher of reading is to effect a congruence in the associations of modalities. A conflict in cognition may develop for the burgeoning reader if what he hears produces different concepts from what he reads. Investigation into the feasibility of bringing about this congruence is currently under way. Further investigation of the associational effects of varying modalities must of necessity concern themselves with the appropriateness of the measurement criterion. The use of paradigmatic responses as a measure of response maturity gnaws somewhat at the investigational purity of any study of this nature; however, the consistency of the results over different populations, different age groups, different social economic groups and different geographical groups suggest that modality is a subject of concern to the psychologist as well as to the researcher in the basic elements of reading.

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THE EFFECT OF READING AND PUNCTUATION VARIATIONS UPON READING COMPREHENSION

This is a study of reading comprehension and how it is effected by reading and punctuation variations when measured by oral noun cloze test, reading time of the passages, and time required for oral tests.

THE PROBLEM

Oral and silent reading present particular problems to the experimentor, with the silent reader being more difficult to monitor. Measurement of the total act is possible, but one cannot easily break this measurement down to component parts. The oral process causes the subject to perform as he projects the author's words with his own voice and is easy to observe. Attempts to more efficiently monitor the silent reader, as shown by Weaver, Holmes and Reynolds (1970), have not been too successful.

Punctuation provides emphasis on the words and phrases (a melody suggested by Huey (1908). If punctuation is removed from a passage, the subject must make his own decision on emphasis. One would expect a loss in comprehension if punctuation is removed since the author's key to proper emphasis is missing.

The use of the cloze as a measure of comprehension is well documented. Numerous studies have shown the correlation between cloze scores and results of multiple choice tests over the same passages as reported by Rankin (1965).

Other researches have looked at reading rates and comprehension, including Gilbert (1940). It seems probable that better readers read faster and comprehend more material, therefore total reading time and total testing time were also used to measure comprehension.

PROCEDURE

Subjects

All 48 subjects were sophomores or juniors affiliated with the Air Force ROTC program (AFROTC) at the University of Georgia. They were volunteers, and all testing was done individually in the evening hours between 6:00 and 10:00 p.m. All subjects practiced in the same conditions they would encounter in actual testing.

Materials

Bormuth (1969) passages, 4, 8, 12, and 16 were selected as the material. Passage one was chosen as the practice sample. Each passage was typed, double spaced, both for reading and for testing. Every fifth noun was deleted until there were 20 deletions in each passage.

Method

The 48 subjects were randomly selected for the 12 different conditions (test conditions–punctuated/unpunctuated x reading conditions –silent/oral/work end x passage conditions – punctuated/unpunctuated. The test was always read aloud by the subject regardless of reading or punctuation condition.

Each student was read instructions and the sample passage and sample cloze tests were in the same conditions as the actual passages and tests performed by that student. Questions were permitted after completion of the sample, but were discouraged after the testing began. Each student read a passage, then took the cloze test on that passage before being handed the next reading passage. Only the exact deleted word was counted as correct. The procedure was recorded on a Revox tape recorder. For the silent conditions, the subject said the word "start" when he began and "stop" when he finished.

For the silent mark end condition, the student tapped a plate with a metal weight at the end of each sentence. The silent, mark end, unpunctuated readers were instructed to guess where they thought the sentence ended and to tap the plate at that time. Total times for reading and testing were obtained from the recorded tape. The stop watch was accurate to one-tenth of a second.

Analysis of the Data

The passages employed were considered of incremented difficulty, and equal increments were selected (4, 8, 12, 16). Analysis of variance and trend analysis were used. The experimental design was established as a randomized block design, with each subject corresponding to a block or row. Edwards (1968) provides a similar sample for conceptual paradign and a method of computing the data. Two error terms are employed. The first error term is appropriate for testing the significance of the test punctuation conditions, the three reading conditions, and the reading punctuation conditions. They are the independent variables. It is also the error term for testing the interactions among these variables.

The second error term is appropriate for testing the significance of the passage difficulty and all interactions associated with passage difficulty. The conservative F was used in each significance test involving the second error term.

Criteria

There were three dependent variables used to test the validity of Bormuth's difficulty levels: total cloze scores on each test; total reading time of each passage; and total reading time of each test. Analysis of variance and trend analysis was used on each of these three variables.

Table 1
Analysis of Variance of Total Cloze Scores

Source	df	MS	F
A (Test Punctuation)	1	9.63	—
B (Reading Condition)	2	46.19	4.00*
(1) Silent Cloze (Mean 7.83)			
(2) Oral Cloze (Mean 9.18)			
(3) Mark End Cloze (Mean 7.62)			
C (Reading Punctuation)	1	16.93	1.47
AXB	2	8.38	—
AXC	1	8.76	—
BXC	2	7.96	—
AXBXC	2	30.50	2.64
Error (a)	36	11.52	—
D (Difficulty)	3	457.78	99.12**
(1) Bormuth #4 (Mean 3.56)			
(2) Bormuth #8 (Mean 10.45)			
(3) Bormuth #12 (Mean 9.12)			
(4) Bormuth #16 (Mean 9.34)			
AXD	3	7.02	1.44
BXD	6	3.47	—
CXD	3	12.42	2.58
AXBXD	6	2.58	—
AXCXD	3	1.17	—
BXCXD	6	1.92	—
AXBXCXD	6	3.02	—
Error (b)	108	4.81	—
Total	191		

* $p < .05$, ** $p < .01$

RESULTS

Analysis of Variance

The results of the analysis of variance of cloze scores, reading time, and cloze test time indicated a significant effect in the difficulty of passages in all three areas with conservative F. In each case, however, the expected increment of difficulty was not upheld.

Source B (Reading Condition) revealed a significant difference at the .05 level with the oral condition superior in mean scores. (Table 1)

The analysis of variance for total reading time revealed significant results in both difficulty of passages and reading punctuation. The interaction between the difficulty of passages and the reading punctuation was significant (see Table 2).

Table 2

Analysis of Variance of Total Reading Time

Source	df	MS	F
A (Test Punctuation)	1	107.70	—
B (Reading Condition)	2	600.58	—
C (Reading Punctuation)	1	21,058.94	6.46*
(1) Punct. Mean time 112.01 seconds			
(2) Unpunct. Mean time 132.96 seconds			
AXB	2	3,116.68	—
AXC	1	288.61	—
BXC	2	289.28	—
AXBXC	2	3,574.08	1.09
Error (a)	36	3,259.49	—
D (Difficulty)	3	16,732.56	32.96**
(1) #4 Mean time 147.81			
(2) #8 Mean time 102.94			
(3) #12 Mean time 118.41			
(4) #16 Mean time 120.72			
AXD	3	228.52	—
BXD	6	350.25	—
CXD	3	2,294.18	4.93*
AXBXD	6	801.13	1.72
AXCXD	3	238.17	—
BXCXD	6	37.26	—
AXBXCXD	6	239.05	—
Error (b)	108	464.81	—
Total	191		

* $p < .05$. ** $p < .01$

Source D was significant at .01 with conservative F, while CXD was significant at .05 with the conservative F.

Silent reading required more time then either oral or mark end reading, although the difference was not significant. The Bormuth difficulty levels appear similar to the results obtained from the cloze scores.

Total testing time revealed only one significant difference, and that was in the level of difficulty.

Table 3

Analysis of Variance of Total Testing Time

Source	df	MS	F
A (Test Punctuation)	1	13,044.91	3.64
B (Reading Conditions)	2	9,223.75	2.02
C (Reading Punctuation)	1	355.88	—
AXB	2	1,026.78	—
AXC	1	1,985.33	—
BXC	2	1,930.15	—
AXBXC	2	2,416.4	—
Error (a)	36	3,577.55	—
D (Difficulty)	3	20,361.09	41.52*
(1) #4 Mean time 187.12			
(2) #8 Mean time 139.36			
(3) #12 Mean time 150.83			
(4) #16 Mean time 152.81			
AXD	3	673.85	1.32
BXD	6	394.64	—
CXD	3	56.48	—
AXBXD	6	57.31	—
AXCXD	3	203.35	—
BXCXD	6	462.36	—
AXBXCXD	6	383.30	—
Error (b)	108	489.74	—
Total	191		

* $p < .01$

Source A, while not significant at the .05 level, was found to be significant between .05 and .10.

Trend Analysis

Using the example from Edwards (1968), the linear, quadratic and cubic trends for cloze scores reading time and testing time was computed and found significant at the .01 level in each case. The Bormuth materials (D_1, etc.) are the stages referred to by Edwards. In all cases the analysis indicated D_1 (Bormuth #4) as the most difficult passage (lowest cloze score, highest reading and testing time).

DISCUSSION

Difficulty Levels

Equally incremented levels of difficulty in the Bormuth passages did not occur in this study. In all three variables used to measure comprehension, the passage ranked easiest by Bormuth (in this study Bormuth passage #4) was the most difficult. This passage (a Charles Dickens excerpt) was extremely difficult to read even when not mutilated.

The other three passages (Bormuth's 8, 12 and 16) were more in line with Bormuth's suggested difficulty levels, although they were not equally incremented. The trend analysis for cloze scores deviated the most from predicted order with #4 the hardest, #8 the easiest and #16 easier then #12. In reading time and testing time there was an increase in difficulty with each passage after #4, but this increase was not equal in increments. In essence, the difficulty levels were significantly different, but not in the expected direction. It appears that Bormuth's predicted difficulty levels do not apply when noun deletion cloze tests are used.

There was only one significant interaction with an independent variable. The significant interaction occurred in total reading time and involved the reading punctuation variation with the difficulty levels. Evidently, the lack of punctuation removed some bits of information otherwise provided and prevented this information from going to the reader, causing the reader to slow down significantly.

Punctuation

The punctuation variable in presentation of the tests had little effect on the comprehension of the material. Evidently the reader gains what information he needs from punctuation during the reading process, and this information produces similar results regardless of the punctuation condition of the cloze test. Test punctuation was significant between .05 and .10 in testing time. The lack of punctuation did slow down the reading rate of the oral test somewhat, but not enough to be significantly slower using $p<.05$ as acceptable level of significance.

Reading punctuation produced a significant difference in total reading time. The reading times for unpunctuated materials were significantly higher, therefore the unpunctuated material was more difficult to comprehend based on reading time. The previously mentioned Dickens passage was particularly time consuming to read without punctuation.

Reading Conditions

The silent reading results were unexpected. Cloze scores results showed significant differences in reading conditions with the mean score of oral reading almost two whole scores better than the silent. Perhaps the silent reader did not attend to the material as much as the oral readers. The possibility also exists that the silent readers were poorer readers, since no efforts were made to balance student ability with testing conditions using standardized reading tests. Another possible explanation is that the students were nervous reading the test aloud, particularly since they all knew the examiner. The oral readers would, perhaps, have less apprehension in reading the oral test since they had already read aloud to the examiner during the reading condition.

Previous studies by Huey (1908) have indicated silent reading to be faster than oral reading. Although the differences were not significant, oral reading was faster than silent reading. Based on observations by the examiner and comments by the subjects, it appears these results are caused more by behavioral actions of the subjects rather than difficulty of the reading conditions.

The examiner was able to observe large jumps in eye movement. In numerous cases the examiner observed the subject reach the bottom of the page during the silent reading, then return to the top of the page and begin reading again. This was done despite the instruction to read the material only once. Many subjects appeared to study the material and review certain areas over and over before saying "stop" to indicate they had finished the reading. Since they were familiar with the examiner on a student-instructor basis, the subjects evidently tried quite hard to do well, and they thought the extra reading might give them an advantage.

The mark end readers were conscious of the examiner knowing their location in the passage (by the taps on the metal plate) and evidently did not attempt to read the material a second time. Comments by the subjects in mark end reading indicated they thought the examiner knew exactly how many taps there should be per passage.

Silent readers were the slowest in reading time and testing time, although the differences observed were not significant. Oral readers were significantly better in cloze scores. It is possible that chance selection placed the poorer readers in the silent category, thus accounting for the slow times in both reading and testing. Perhaps the attention required in reading each word aloud resulted in increased comprehension for oral readers as suggested by Langman (1960). Evidently these subjects were able to get more pertinent information from the material than the others.

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TOWARD A SYSTEMATIC APPROACH TO HOW THE READER USES CONTEXT TO DETERMINE MEANING

What variables influence the reader's use of context as an aid to determining the meaning of ambiguous textual units? The outcomes of researchers' attempts to explore specific hypotheses related to this question tend to lack a systematic structuring. The three purposes of this paper are to present a brief overview of what major variables have been found to influence the reader's use of context; to present several reasons for the lack of a systematic structuring of empirical findings; and to suggest that at least the effects of semantic and syntactic variables on the reader's use of context must be established to formulate a systematic data base from which a comprehensive account of the relevant facts can be made.

Rentz (1970) stated that theory is the ultimate objective of science. He contends that methodology must be seen within its proper context as only a portion of a larger research process. Thus, there exists a depending relationship between theory and data, such that theory must always refer back to empirical reports and at the same time point forward to new empirical areas. Reading research concerned with what variables influence the reader's use of context to determine meaning has been sorely lacking a consistent production of movement from empirical reports toward new empirical areas.

Weaver (1969) pointed out that regardless of what criterion of research is used, reading investigations have not produced theoretical structures which engender confidence that any sort of theory-research interchange is going on.

The applicability of Weaver's observations to the study of context is suggested by the broad gap between approaches to the study of context used by psycholinguistic and educational researchers. Moreover, a direct information interchange appears to preclude a theory-research interchange (Otto, 1970).

Studies of context useage carried out from 1952 to 1965 by reading specialists have substituted *a priori* opinion for theory development and have been narrowly confined to clue schemes (Ames, 1960; Artley, 1943; Edwards, 1959; Guarino, 1960; McCullough, 1945; Quealy, 1969; Rankin and Overholzer, 1969; Seibert, 1945; Stearns, 1945). Clues such as main ideas, parenthetical clauses, mood and tone, words in a series etc. have been analyzed. However, the studies of such textual segments have not been carefully controlled. The measures, the responses, the research designs, and the statistical analyses used have been too confounded to offer a data base for theory-research interchange.

Psycholinguistic research has tended to try to establish empirical data to define the constraints of textual segments. Position of a word (Aborn and Rubenstein, 1957; Kaplan, 1950; Rothkopf, 1963) has been found to place constraint on the correct responses given to a deleted word. The bilateral distribution of a text (Aborn, Rubenstein and Sterling, 1959; Ervin, 1963), grammatical class form of a word (Bhooma, 1969; Louthan, 1965; Potter, 1968; Weaver, Bidding and Ford, 1968), word frequency (Gorman, 1959; Hall, 1954; Wilcox, 1968) and syntactic variables (Clay, 1969; Coleman, 1965; Goodman, 1967; Tatham, 1970) have been shown to influence the readers response to a completion task where words are deleted from a textual situation by some specified procedure. However, psycholinguistic findings also lack an ordered structuring from which new empirical areas can be clearly suggested.

Weaver's (1965) propositions about responses to cloze measures provided a structure that pointed to new areas of empirical study relevant to the description of the reader's use of context to determine the meaning of a word unit. He proposed that reading, as decoding, proceeds sequentially from left to right and perpendicularly at every language unit in sequence. Thus, a deletion met in context imposes on the reader a search procedure controlled by hypothetical differential relationships among the immediate syntatcic and semantic variables on particular language units. Weaver did not consider human search procedures to be logical or exhaustive. Yet, since 1965, few reading researchers (Bickley, Ellington and Bickley, 1970) have used cloze procedures systematically to determine differentials between semantic and syntactic constraint variables.

There have been a number of recent psycholinguistic studies of reading which lean heavily on models of grammar developed by theoretical linguists. Perhaps Chomsky (1957, 1962) has been given to be the most prominent source of influence. The importance of theoretical models of grammar lies in the fact that they provide a frame of reference, within which hypotheses and the results of empirical tests can be linked together to formulate theoretical constructs directed toward new areas of reading research. An excellent example, Schlesinger's (1968) investigations of sentence structure provided a series of studies yielding data about the effects of snytactic variables on reading behaviors. Schlesinger's research was unique because it included systematic experimentation, utilized replication to test alternative sources of explanation, focused on one specified level of textual constraint, and proceeded within a set of specific research hypotheses formulated in concordance with a model of grammar.

Certainly, evidence has been found without models that syntax effects the determination of word meaning and effects the interpretation of units of printed information larger than the word. Syntactical constraint variables have been reported to operate at both mature and beginning stages of reading behavior.

Miller's (1962) early exploratory studies of oral conversation showed that the unit of speech is larger than the word unit and nearer a syntactic constituent. Since then, a number of studies have offered compelling evidence that the reader decodes print in units which are syntactically determined (Clay, 1968; Kolers, 1970; Morton, 1964; Weber, 1968).

One sound indication of the efficacy of syntactic effects on the reader's use of context is the consistency of reports using different response indices. A variety of response indices have been used which indicate that the reader is highly sensitive to the grammatical relations of the content he reads. Labov (1967) used proper intonation of homonyms as an indicator of the presence of syntactical constraint effects on word units. Oral error indices (Goodman, 1968; Weber, 1970) have been used to analyze, by logical deduction, the operation of syntactical constraints on textual units larger than the word. Response latencies (Ammon, 1968) as units of analysis have indicated that latencies to oral probes are longer at syntactic constituents. Indices of correct responses to completion measures (Coleman, 1965a) or multiple choice measures (Tuinman, 1970) under varying, nonsensical or distorted language conditions suggest that syntactical variables may pose serious problems for decoding than will distortions of semantic variables.

Hence, theoretical models of grammar have indirectly led to a dearth of studies which, when systematically gathered and analyzed, may provide estimates of the parameters of syntactical constraint variables operating on the reader's use of context to determine meaning.

The lack of systematic research reports like Schlesinger's should be a matter of grave concern. That is, even an abundance of rigorous research findings doesn't ipso facto provide a clear view of interrelationships between syntactic variables.

An implicit danger in the present approaches to studying context is in emphasizing bits and pieces of reading behavior (Otto, 1970) to the exclusion of the formulation of theory which ultimately includes both syntactic and semantic accounts of the textual constraints used by the reader to determine meaning during the reading act.

Semantic theory (Katz and Fodor, 1963; Steinberg, 1970) has been stated to take over the explanation of a speaker's ability to produce and understand new sentences at the point where grammar leaves off.

Katz and Fodor (1963) suggested the form in which such a theory may be characterized. The objective of semantic theory would be to reconstruct the interpretation of sentences. Though a logical distinction between a theory of grammar and a theory of semantics is desirable, its psychological existence is a matter of empirical test. Two obvious distinctions may suggest the basis for a logical separation. First, suppose one reads "The dog bit me" and "The rat bit me." Though the sentences only differ morphemically, they are interpreted as different in meaning. Other sentences differing only morphemically are interpreted as identical in meaning, e.g. "The oculist examined me" and "The eye doctor examined me." Grammar cannot account for these facts. Second, some sentences of radically different syntactic structure are synonymous, while other syntactically different sentences are not, e.g. "Three girls are in the room" and "There are at least three persons in the room and each is a girl." Grammar cannot account for the interpretation of these types of sentence structures. Katz and Fodor point out that the interpretation of such sentences is determined in part by the meanings of their morphemes and by semantic relations among morphemes. They suggest a theory of semantics must include at a least a dictionary component and a set of rules with which to project variables that affect the possible readings of ambiguous sentences and the selection cues used to interpret lexical meanings.

Raygor (1970) purported that the development of a definition of reading must specify the stimulus response situation and a criterion for determining whether a response is in control of a stimulus. Similarly, studies of semantic variable and syntactic variable functions should be carried out by specifying the independent variables, and the units of observation inferred to represent that the observed response is in fact under control of the hypothesized stimulus.

However, a note of caution is merited where language situations are contrived such that they have no counterpart in natural language or textual situations. To be sure, studies of highly nested sentence structures (Schlesinger, 1968) or negative, passive, and negative-passive sentence forms (Tuinman, 1970) have been shown to fit Raygor's criteria for defining reading, but are highly contrived and artificial samples of the difficulty of interpreting textual or oral language segments. Furthermore, caution is warranted in assuming that learning and comprehension processes are necessarily isomorphic and that the variables identified as important in one situation are equally important in the other. For example, Danks (1969) found that interword association and word frequency individually accounted for only one percent of the variance where the dependent variable of interest was sentence understanding as measured by responce latency indices. Assuredly Danks' findings are limited to mature readers. Yet, other investigators (Rosenberg, 1966; Tulvung and Patkau, 1962), working with similar age levels, have shown both variables to have significant effects on learning of verbal material.

A few studies have been carried out which empirically contribute to the efficacy of the common sense notion that semantic as well as syntactic constraints must ultimately account for the determination of meaning during the reading act.

At the word level where a reader is confronted with an unknown word (Werner, 1954), studies have shown that low-literate adults as well as younger children give evidence of a lack of differentiation between word meaning and sentence meaning. Often meanings of words were entirely dependent upon the meaning of the sentence. A more recent replication of these findings (Amster, 1967) indicated that concept attainment of an unknown word is facilitated by a small variety of good context settings. But if the contextual setting is poor, a large variety on contexts is more likely to produce a learned word at a conceptual level. Apparently the effects of a varied contest is dependent on contextual constraint variables.

At the sentence level of interpretation Danks (1969) found that the understanding of sentences was primarily a function of meaning and to a lesser extent a function of grammar. Ratings of sentence comprehensibility were also shown to yield three factors comprising the comprehensibility of sentences: ungrammaticalness, unmeaningfulness; and the joint function of grammar and lexical meaning. Downey and Hakes (1968), and Schwartz, Sparkman and Deese (1970) have shown that subjects can scale meaningfulness independently from grammaticalness when presented with semantically deviant sentences. Perhaps the same kinds of rules profitable in the analysis of syntax constraints may not be productive when applied to the study of semantic contraints operating on the reader while he interprets sentence meaning (Perfetti).

At the paragraph level, Koen, Becker and Young (1969) have suggested that the paragraph is a psychologically real unit. Furtthermore, they found that the identification of paragraph structures in normal English versions of passages was largely based on semantic cues. A median correlation of .71 was found between the proportion of subjects marking paragraph boundaries in nonsense and normal versions of the same English passages. The responses of children, ages 7 to 8, indicated that the concept of "paragraph" was not meaningful to them. Furthermore, the relationship between semantic and formal markers contributing to the discrimination of paragraph structures was not a simple one. Identification of paragraph structure appeared to be effected by increases in age and educational experience.

In conclusion, definitions of context and specific contextual constraint components must arise out of experimental research designs which account, through experimental manipulation, for the independent effects and interaction effects of semantic and syntactic textual variables.

The inclusion of hypothetical constructs as analogues to theory development are necessary. They provide a framework within which empirical findings can be systematically tested and, thereby, used to formulate new directions which lead to a comprehensive mapping of those textual constraints used by the reader to determine meaning at various levels of the organization of coded information. To accomplish such an ambitious goal requires that at least syntactic and semantic models be developed which are logically consistent with the facts known about textual constraint variables. When operationally defined these variables can be systematically tested. Models should be replicated across developmental levels of reading behaviors. The means of obtaining response observations should be considered intervening variables. Observational conditions must be replicated to ensure that sampling error alone is not accountable for the accountable variance and/or statistical differences attributed to semantic or syntactic variables. Finally, the outcomes of such research efforts must be translated into the reading skills language and teaching situations relevant to the instructional practices of reading specialists.

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CLASSIFICATION OF FACTORS AFFECTING READING PERFORMANCE

Exactly what to call this paper is perplexing. My first inclination was to call it a *task analysis* and the intention was to try to lay out to the best of my ability all of the factors that went into the task of reading or learning to read (which I realize are not exactly interchangeable terms).

But a task analysis is somewhat behavioral and many of the categories in reading are certainly cognitive, if not affective. And certainly part of the categories discussed are functions of the material such as legibility and readability. So I considered the term "A Classification of Variables That Affect Reading." Certainly the term "taxonomy" seems a bit formal and seems to apply to a better structured classification and better suited to some simpler topic such as classifying all living things.

I hope that this classification might be useful to somebody sometime. Perhaps some lone graduate student looking for some unplumbed variable for a thesis topic could get an idea from it. Maybe teachers could gently cram it down the throat of some innocent parent who wants to know why it is so hard to teach his child to read when the other kids all seem to learn. But in reality, it is probably only educational researchers who are apt to appreciate its complexity and understand its many faults. So, its short term goal is the improvement of research design, and its long term goal is the improvement of materials and methods for teaching reading. A few courageous college instructors might use it to influence their course structure or give it to students who wish something more than the instructor's manual for Dick and Jane.

This classification is based on one I did for the programmed instruction area that appeared in my book, *Teaching Machines and Programmed Instruction* (1963), and it has been modified for reading purposes and will appear in my next book, *Reading For Classroom and Clinic* (in press).

CLASSIFICATION

A. *Sensory Input*
  1. Visual
    a. Opaque
    b. Projected
    c. Color–contrast
  2. Tactual
  3. Kinesthetic

It seems logical to start classification with a discussion of sensory input. One of the obvious things about the reading act is that some sensory input must be received by the reader. In reading, this input is received usually through the visual sense, since almost by definition, reading requires use of the eyes; however, there are exceptions, notably the reading done by blind persons, who use their tactual sense. Occasionally in a remedial reading or special reading situation, the tactual sense (sense of touch) is used by having the students feel raised letters or trace words in sand.

One rather famous method, developed by Fernald, emphasizes the kinesthetic sense in which sensory input is carried to the brain by the movement or position of the muscles. Fernald's method is really a multisensory approach in which the child traces letters with his finger, so that tactual, visual, and kinesthetic senses are usually employed simultaneously.

Some of the problems in the reading act that would fall under the sensory input category relate to the validity of visual perception training. Research reports certainly are not clear on the value of this type of training, but neither do they state clearly that it should be disregarded. A number of reading teachers have used tachistoscopes and some of the reading-readiness activities involve so-called perceptual training.

Another type of problem that might fall into this area is the question of whether there is any difference in reading comprehension or reading efficiency if the material is presented by an opaque or projected image. An ordinary printed page is an opaque image, and a page or word projected on a screen is an illuminated projected image. Research needs to be done to see whether there is a different stimulus value in terms of reading comprehension. Some comparison studies have made use of colored ink or paper.

B. *Mediating Activity*

1. Vocalization
2. Sub-vocalization
3. Thinking about
4. Phonics
5. Word-part recognition

Between the time when the reader sees the reading material and makes a response, some type of mediating activity usually occurs. This activity may be overt or covert. Vocalization, for example, is quite obviously overt: the student, while reading for himself, will say the words so that somebody sitting near him can hear him say them. This is generally not advisable for silent reading, but it often occurs with poor or beginning readers. Sub-vocalization cannot be observed by someone else, and goes on inside the reader's head. He says the words to himself so that he may "read" or comprehend. Some research has shown that during most so-called silent reading there are very minute muscle movements in the tongue or vocal chords. Other observations show that some reading comprehension can occur with virtually no sub-vocablization.

Elementary children are often told to think about the material, both in oral and silent reading. It is difficult to give the proper intonation of the sentence if the student does not understand it and does not think about what it means. This point touches on a problem of major concern to teachers and researchers, i.e., the nature of internal processes involved in reading. Undoubtedly, the reader is testing what he is perceiving against a mass of background information. For example, when he perceives the word "dog" it calls up some memory of a dog or a concept of a dog in his mind. Exactly what goes on in the brain during the reading act is not known, but physiologists are beginning to pinpoint with some precision various areas of the brain. It is hoped that some insights will be forthcoming as they are able to map out in greater detail the brain areas which deal with speech, memory for colors, arousal of emotional feelings, visual imagery, word knowledge, and others.

Very poor readers may need phonics to help them unlock certain words. If a student looks at the word, has to think of how the letter sounds, translates this into a word which he knows by listening, and then acts upon the word or fits it into his comprehension scheme, all of this is mediating activity. Instead of using phonics in the initial step, many students use word parts for difficult words. They may know the parts of a word separately, and be able to put them together, or they may know one and be able to guess the rest using context cues.

It is probably quite safe to say that at all levels of reading, from beginning to the most advanced, a good deal of mediating activity takes place, although the type of mediating activity probably changes as the reader matures.

C. *Response*

1. Observable Behavior
    - a. Read aloud
    - b. Perform act
    - c. Answer questions in writing
    - d. Answer questions orally
    - e. Emotional response (cry, laugh)
    - f. General attitude or behavioral change
2. Content of Response
    - a. Repeat verbatim
    - b. Paraphrase
    - c. Summarize
    - d. Criticism and higher order verbal acts (see Bloom's Taxonomy
3. Delay of Response
    - a. Immediate
    - b. After varying delay

The response is generally what might be called doing something. Perhaps one of the most common observations of reading behavior in the elementary school is reading aloud. However, there are numerous other ways of responding to written material; the reader may perform an act or answer questions either in writing or speaking.

Another type of response is an emotional response which is observed in such reader response as laughing, crying, or exhibiting other evidence of feeling. Somewhat less direct, although perhaps of greater importance, is a general change in attitude or behavior which persists over a longer period of time.

The form of response may display considerable variability. Bloom's Taxonomy could be applied to the reading act. It was seen that responses to reading can vary all the way from giving facts or practical applications to critical analysis.

The response to reading need not always occur during the reading act, or immediately following it. The delay of response may be extended for as long as a lifetime. The most usual measure of comprehension is to have the student make responses to questions almost immediately after the reading; but frequently, as in tests of various subject matter courses, the student may be expected to respond some hours or months after he has read the chapter. Delay of response brings in the factor of memory and other factors of learning.

D. *Reward and/or Motivation*

1. Primary
2. Secondary
3. Knowledge of results

4. Subjective
5. Punishment
6. None (incidental)
7. Set

Some psychologists state that people do not do anything without expectation of a reward, whether the reward be money, food, or a feeling of pleasure. In any event, nearly every act has some kind of consequence. The kind of consequence that the act produces helps to determine whether the act will be continued or repeated, and, if repeated, whether it will be modified.

The topic of reward is almost indistinguishable from the topic of motivation. Why does a person do something? He does it because he will be rewarded or because if he does not do it he will be punished, and the absence of punishment is, in itself, a type of reward. Knowledge of results is a type of reward. Knowing that we have done something correctly tends to encourage us, to make us feel good. If we find out that we did not do it correctly, we know that we must modify our behavior in order to be rewarded in the future.

Psychologists have broken rewards down into two categories: primary and secondary. Primary rewards are those which satisfy body needs directly. For example, a person without water is rewarded by being given water, etc. Secondary rewards are those which lead to primary rewards. For example, money is a good secondary reward because it can be used to buy food or warmth or satisfy various other primary needs. Man has in common with animals a variety of primary needs, such as food and warmth; but man is distinguished from animals by his more elaborate and often highly subjective needs. Ego satisfaction, which drives men so far in life, or curiosity about the stars, which motivate others, are difficult to equate with the primary need structure. Nevertheless, they have real motivating power. They can cause students to want to learn how to read, and can drive them to read book after book.

Punishment should also be classed with rewards because it does act as a motivating force. Whereas corporal punishment has all but vanished from our schools, its subtler forms (teacher's scorn or extra work assignments) are still factors in many learning situations.

There are times when students learn for no apparent reason. This is called incidental learning. It can sometimes be accounted for if we say simply that a person is naturally curious and wants to learn just because there is something to be learned. Another variable is the student's "learning set," in which case the learning is greatly enhanced when the student intends to learn. Any teacher can testify to the importance to the student of wanting to learn how to read.

Motivation, it is seen, is closely interrelated to many other factors. If the student is highly motivated, he can read material which has a high difficulty level, or can learn with less practice, or can learn faster. Most of the variables in the classification are highly interdependent.

E. *Knowledge of Results*
  1. Type
    a. Simple (right or wrong)
    b. Correct response (shown if wrong)
    c. Explanation given
  2. Method of presentation
    a. Teacher
    b. Answer key
    c. Programmed instruction
    d. Life situation

We have already mentioned that knowledge of results is one of the important factors affecting the reward. Since it is also an important part of the teaching situation, and is usually controlled by the teacher, it should be given attention again at this point. The simplest type of knowledge of results in the teaching situation can be illustrated by the teacher who says, "That's wrong." A slightly better teaching situation might occur when the teacher says, "The word was cog not dog." A superior situation would be when the teacher says, "The word was cog–don't you notice that the beginning letter is C not D?" Hence these three examples show the three main types of knowledge of results: (a) simple (right or wrong); (b) correct response; and (c) explanation given.

In addition to the teacher, such reading materials as games, workbooks, and teaching machines can also give all three types of knowledge of results. While the teacher's explanation might appear on the surface to be the best type of knowledge of results, it is probable that it is the best type only in certain situations. It is the most difficult and time-consuming to give. Sometimes the simple type of knowledge of results can be so quickly and easily administered in such situations as programmed instruction, that it is administered with a high degree of frequency, and is equally effective. However, the method by which the knowledge of results is presented may have high value and affect the reader's comprehension. He may consider the knowledge of results more important if the teacher tells it to him. Many workbooks and other training materials such as reading laboratories have answer keys for the student to check answers following various comprehension drills. A newer learning technique, that of teaching machines and programmed instruction, places heavy emphasis on the immediate and complete giving of knowledge of results. Programmed learning would give the student knowledge of results immediately following each question or small segment of material.

Out of school, in real-life reading situations (as opposed to training situations), the reader frequently gets knowledge of results. If he is trying to follow a set of printed directions, his inability to assemble a machine might quickly tell him that his reading comprehension is lacking.

F. *Reward Variations*
   1. Amount
      a. Fixed amount per unit
      b. Variable amount per unit
   2. Frequency
      a. Every unit
      b. Not every unit (partial; fixed ratio; variable ratio; fixed interval; variable interval)
   3. Relation to response
      a. Indiscriminate (occurs whether response is right or wrong)
      b. Discriminating (only right answers rewarded)
      c. Shaping
   4. Timing
      a. Immediate
      b. Delayed

This is a rather technical category, but it has some interesting teaching applications. The first section deals simply with the question of whether a constant or variable amount influences the rate of learning. For example, some teachers might always say, "That's good," if the student answers a question correctly or reads orally satisfactorily. At other times the teacher might go into brief periods of ecstacy about the superlative performance of the child. Some parents have the questionable practice of paying children for bringing home A's and sometimes the amount of reward can vary considerably from the elementary school child who gets 25 cents for an "A" to the high school student who receives an automobile. There can be little doubt that the amount of reward has some effect on the student's performance.

The section on frequency uses many terms derived from B. F. Skinner's work with animal performance. However, it has some interesting implications for the teaching of humans. A fixed ratio would provide student reward every time he answered a question, or every fifth time he answered a question, while a variable ratio might mean that he would be rewarded on the average of every fifth question. Likewise, the variations in interval have to do with the time elapsed; for example, the teacher would tell the student he was doing good work every five minutes exactly, or would reward him on the average of every five minutes. Incidentally, experiments with animals have shown that much more continuation of the activity will occur under a variable type reinforcement. Since this highly irregular spacing of intervals is the type of reinforcement which occurs in most classrooms; it is likely that this also tends to promote greater continuation of the performance after the rewarding has stopped.

Only a very poor teacher would use indiscriminate rewarding, or tell the student he was doing well, regardless of the merit of his performance. However, some teachers who do not take proper care of their grading may be doing this.

An interesting notion related to this area is that of shaping or rewarding the student only as he comes closer and closer to the desired goal. In this situation, the teacher gives a reward for very simple and even for only partially accurate responses at the beginning of training, but as training progresses and the student matures, rewards are given only for increasingly better responses.

Most studies in psychology agree that the more immediate the reward after the act, the better the learning. Teachers should set up lessons which would allow the student to know as quickly as possible after he has performed an act whether or not it was correct. This is one reason why tutoring is more effective than large-class teaching. Immediacy of knowledge of results is one of the strong points of the programmed learning and teaching machines. Workbook and teaching materials which are self-correcting or can be corrected by the student in a group immediately after he has responded also take advantage of this principle.

G. *Rate of Reading*
  1. Student controlled vs. other control
  2. Speed set
  3. Relaxed
  4. Study set
  5. Skimming

The rate of reading is usually controlled by the student, but there are some special circumstances in which other controls can be applied. For example, a pacing device has a shutter which slowly covers the page, forcing the student to read at a certain rate. The rate of reading can also be greatly varied by the student's intention. If, for example, he has a speed set and tries to read as fast as he can, his reading speed will definitely be faster than when he is relaxed. The purpose of his reading will sometimes affect his rate of reading. Sometimes the student will wish to study slowly enough so that he can remember every detail; at other times he will merely skim to glean the main ideas or to pick out certain kinds of information.

H. *Practice and Review*
  1. Practice or review vs. none
  2. Planned practice or review

3. Only as needed
4. Amount learned or read before practice
5. Massed vs. distributed

Let us look at the Practice and Review section from the standpoint of reading comprehension, even though all of these categories could be applied to practically every kind of reading lesson. In the first instance, different types of reading comprehension will ensue for the student who is allowed to reread the materials as he wishes. This review may be planned; for example, the teacher may say, "Be sure to read this page twice;" or the student may simply go back and read a paragraph he did not understand clearly.

The amount of material that a student reads before reviewing also can affect his comprehension. The student who reads an entire book before going back may have better comprehension than the student who rereads each page as soon as he is done with it.

The topic of mass vs. distributed practice has been studied for some time. This refers to whether the training or reading is done all at once or at spaced intervals. A student who reads a topic for a half hour a day might comprehend more fully than the student who spends eight hours in one day reading the material.

I. *Readability*
   1. Legibility
   2. Word difficulty
   3. Sentence difficulty
   4. Style difficulty
   5. Picture or graph cues
   6. Familiarity-student with subject
   7. Difficulty of subject

Readability and readability formulas are discussed in some detail in a later chapter. Our concern at this point is to mention two aspects of most readability formulas—word difficulty and sentence difficulty.

One would expect such things as legibility and spacing to affect the readability of the material. Anyone who has tried to read an old book printed in very small type with little space between lines has probably been impressed with the difficulty and laboriousness of reading this type of material.

The writer's style also affects readability. Some authors express themselves in a crystal-clear fashion, while others, writing on the same subject, seem to do their best to confuse the issue. It is quite possible that part of the difficulty could be due to differences in the reader. The first writer may be able to communicate with a certain type of reader because he has amassed a similar background, vocabulary load, mode of expression and other traits.

Frequently beginning reading books rely heavily on pictures to provide clues to the meaning of the reading material. Other books, particularly texts, use pictures and graphs for further elucidation of the ideas expounded in the text. *The difficulty of the subject matter* is also related to the readability of written material.

J. *Reading Content*
  1. Scientific
  2. Social Science
  3. Artistic, poetic, literary
  4. Mechanical
  5. Language style and variaitons
  6. Mathematic
  7. Philosophical

Some persons can read about Political Science with ease but have difficulty reading about Biology. This section is intended to enumerate some of the different types of reading materials which are interdependent variables in the task of teaching reading comprehensibly. These subject categories are partcularly related to the student's individual experience, interest and learning. No attempt is made here to give an exhaustive list of content areas. Melville Dewey and the Library of Congress have devised a detailed system for classifying reading matter.

K. *Subject Matter Organization*
  1. Chronologic (historical)
  2. Unit (natural unit in subject matter)
  3. Problem-centered
  4. Descriptive
  5. Sequential (steps 1, 2, 3, etc.)
  6. Theoretical
  7. Practical
  8. Analytic (whole to part)
  9. Synthetic (part to whole)

These categories are fairly self-explanatory. The thing to keep in mind here is that a change in the type of organization can affect comprehension, rate of reading, and the amount of practice needed. In short, each category is a dependent variable.

L. *Supplementary Presentations*
  1. Visual
    a. Pictures
    b. Graphic material
    c. Filmstrips
    d. Motion pictures
    e. Written (charts, outlines)
  2. Audio
    a. Verbal
    b. Music
  3. Laboratory experience (realia)

4. Instructors (to answer questions)
5. Discussion group
6. Reference materials or text
7. Traditional class or lecture
8. None

Quite frequently elementary texts provide aids to comprehension. in addition to the written material. The pictures in pre-primers are a famliiar supplement. They almost carry the story. In many textbooks and in most other types of books, pictures and graphs often provide valuable aids for understanding the written text. The pictures and graphs are not always printed in the book, but may be presented by the teacher or made available to the student elsewhere. Some teachers, for example, make excellent use of filmstrips and motion pictures to stimulate interest in reading and to motivate the students to read stories or books.

The supplements are not all visual; frequently a talk by the teacher or a record serves much the same purpose. Some experimental use has been made of having students read while music is being played. There are numerous ways of supplementing reading experiences. Laboratory experiences and realism (for example, seeing a *real* fire engine) are two of these ways. Merely having the instructor around to answer the students' questions can be another important form of supplemental help, as are discussion groups, reference material, and traditional lessons on the subject being read about.

M. *Classroom Environment*
1. Teacher personality (dynamic, bright, etc.)
2. Teacher training
3. Peer-group pressure
4. Physical conditions (temperature, ventilation, noise, etc.)
5. Classroom emotional climate
    a. Autocratic—Unstructured
    b. Hawthorne effect
6. Size of class or group

In the classroom many things affect learning. A teacher who is bright and dynamic may be better for most children than a slow and dull teacher. Students pick up many of their attitudes and aspirations from the peer group or other students. In some communities some groups would highly value reading and learning to read, while others might place less emphasis on it. The physical conditions of the classroom affect reading or learning to read. It would be quite hard to concentrate on reading if the temperature were a constant 99 degrees, and the ventilation poor. Numerous physical distractions can detract from reading comprehension—noise, movements, and other sorts of distracting stimuli. Classrooms or learning groups also require various emotional climates. Some students, it has been observed, perform better under a relatively authoritarian teacher and others under a *moderately permissive teacher. Another factor which affects the class-room emotional climate* and has limited many research studies is the "Hawthorne effect," which occurs when the student and teacher know that they are in an experiment, and try harder than they normally would, thereby giving the experimental group falsely high results. While it is by no means clear that poorer instruction is always done in larger groups, the class size or reading group size can affect learning. Some students pay attention better in smaller groups than they do in larger groups.

N. *The Lesson*
1. Length of lesson
2. Variety in the lesson
3. Variety of different lessons
4. Frequency of lessons
5. Time of day
6. Time of year
7. Individual's activity

If a lesson goes on too long, learning will cease. Variety within the lesson can sustain interest and prolong the effective training time. Varieties in the types of lessons can also help to sustain interest and increase learning.

The frequency of lesson periods also affects overall learning. Whether lessons are held twice a day or once a week can make a difference, even though the total training time remains the same. The time of day and time of year also make a difference. Trying to teach reading during the last hour of the day or during the last week of the school year is a difficult and trying task.

The amount of activity engaged in by each pupil also affects his interest and learning. Donald Durrell offers an interesting learning concept which he calls "density of response." An example of a very low "density of response" lesson (and hence a poor lesson) is the typical situation in which the teacher says, "Johnnie, come up to the board and point out the long A." Much time is wasted while Johnnie walks from his seat to the blackboard. Moreover, only one student is active in pointing out the A. With this type of instructional situation, the average student could make very few responses each hour and each day. In contrast, under a programmed learning situation, each student makes a large number of responses per unit time.

O. *Individual Differences*
1. Learning ability
    a. General intelligence (e.g., Binet IQ)
    b. Simple factoral systems (e.g., Wechsler Intelligence Scale for Children, Primary Mental Abilities Test

  - c. Complex factor system (e.g., Guilford)
  - d. Extrasensory perception
- 2. Biological factors
  - a. Age-maturity
  - b. Health (general, eyes, ears, etc.)
  - c. Fatigue (initial and terminal)
  - d. Sex differences
  - e. Body chemistry
- 3. Personality characteristics
  - a. Personality types and factors (e.g., Thematic Apperception Test, Minnesota Multiphasic Personality Inventory, introversion-extroversion needs, achievement motive, the work of analysts Freud, Adler, Jung
  - b. Mental health

Intelligence is undoubtedly the chief factor in reading comprehension. Measures of intelligence seem to proliferate with the years. Certain factors, such as memory for symbols, or ability to synthesize, might have much greater bearing on the reading act than other intellect factors. There are also special types of differences in learning abilities. Some children prefer to learn from a visual rather than an auditory stimulus. The extreme example of this is "idetic imagery," in which the person with this ability can close his eyes and yet retain visually the entire page.

Another factor which may affect learning or reading comprehension is the ESP or extrasensory perception phenomenon. While ESP research is not accepted by all behavioral sciences, it is slowly growing in acceptance as a research variable. If, for example, it does exist in certain students, these students could be facilitated in learning to read, if other students were also reading the same passage at the same time, even though the other students were reading it silently.

No one doubts that there are solid biological factors affecting learning and comprehension. In most cases it would be difficult to teach a two-year-old or a ninety-two-year-old to learn to read. Determination of the ideal starting age is still a highly controversial matter, but most western nations seem to have settled on an age somewhere between five and eight. Poor health can affect learning as well as fatigue. There is a distinct sex difference in learning to read; girls are superior to boys. Finally, there are a number of other physiological differences, such as body chemistry, alterations of which can facilitate or impede learning or comprehension. Some common examples of changes in body chemistry would be endocrine dysfunctions or the use of drugs.

The study of human personality is itself worthy of many books. Much work has been done in this field. Some of the work on personality has been done from the standpoint of the healthy personality, but much more of it has attempted to understand and cure the abnormal or mentally unhealthy personality. Mental health, of course, can have an overriding influence on learning or reading and, as a factor in a classification cannot be igored.

P. *Environmental Influence and Previous Learning*

1. Social class
2. Knowledge
    a. Basic skills (particularly language and writing)
    b. Subject matter
3. Childhood
    a. Rearing practices
    b. Home influence
4. Emotional learning
    a. Pleasant
    b. Unpleasant associations

If we don't know anything about 100 children except that they come from lower-class homes, and we have another group of children that we know nothing about except that they come from upper-class homes, we can immediately predict that there will be much greater reading achievement in the children from the upper-class homes. There are many reasons for this, but research has shown that the children from the upper-class homes learn easily, have fewer failures, and read more. Part of this has to do with such factors as the education of their parents, the values of their parents and friends, and the types of occupations the children are expected to enter. Hence social class is a variable in learning to read, or in the amount of reading done.

The student's previous learning also affects his reading comprehension and future learning. Whether or not he is accomplished in the basic skills of writing and spelling, or whether or not he knows about a tractor, a switchblade, a bank, an iguana—all make a difference in his reading comprehension and learning ability.

Many psychologists believe that childhood rearing practices have definite influences on the school behavior of children. Whether or not the child has received adequate amounts of his mother's attention may affect his reading. Whether the child is punished with a razor strap or verbal chastisement for bad behavior can affect his school performance. Likewise, a child picks up many pleasant and unpleasant associations at home and learns to love, fear, or dislike reading.

Q. *Measurement of Reading Ability*

1. When measured
    a. During learning
    b. Immediate post test
    c. Delayed post test

2. What measured
    - a. Rote memory for facts
    - b. Generalization of concepts
    - c. Transfer of performance
3. How measured
    - a. Recall (unaided memory, ex essay test)
    - b. Recognition (memory with stimulus support, ex multiple choice test)
    - c. Relearning (savings score)
    - d. Performance test
    - e. Cloze test
    - f. Speed
    - g. Attitude scale or inventory
4. Type of scoring
    - a. Number right
    - b. Number wrong
    - c. Rights minus wrongs
    - d. Probability of responding correctly
    - e. Subjective rating
    - f. Derived indicators (acquisition curves, retention curves)
5. Reading subskills
    - a. Phonics
    - b. Context clues
    - c. Word analysis (roots, etc.)
6. Related Reading Skills
    - a. Reference skills
    - b. Reading poetry
    - c. Detecting propaganda

This review of ways of measuring reading ability is intended to give some suggestions for the measurement of reading skill and comprehension. "How well does a student read?" is not a simple question. Nearly every factor listed in this section bears on the answer, and most of the categories in the total classification have direct implications.

R. *Training Efficiency*

1. Cost of materials
    - a. Initial investment
    - b. Long-term investment
2. Training time required
3. Quality of students required
    - a. Aptitude level
    - b. Prior experience
4. Quality of instructor required (cost)
    - a. None required
    - b. Formal qualifications (e.g., degrees)
    - c. Other qualifications (e.g., personality)

5. Logistics
    a. Space requirement for training
    b. Space requirements of material
    c. Maintenance required for material
    d. Re-usability
6. Percentage of students reaching criterion
7. Amount of learning
    a. In comparison to other methods
    b. In comparison to objectives
8. Acceptance of training method
    a. By students
    b. By instructors
    c. By administration and others
    d. By parents

This category is really intended more for the administrator than for the teacher or student, although it can affect them all.

The task analysis concept frequently comes from military or industrial training situations, and the ultimate factor that the administrator searches for is efficiency. Cost is an ever-present factor and must be taken into account in all educational situations. Even though one particular system may be twice as good as another, if it costs 200 times as much as the other system, it probably will not be used. If the cost is the same and yet the program takes four times the amount of training time, it also probably will not be used. Likewise, if the situation works only on very high-IQ children, or if the system works but there is a fairly high percentage of failures, one must expect that the system will be readily discarded. Finally, if the training method is rejected by parents or teachers, or children, or administrators, it will undoubtedly be discarded. Hence teachers as well as administrators must take these training efficiency factors into consideration before and during the teaching of reading.

CONCLUSION

This classification, while far from complete, is intended to give an overview of the complexity of the reading act, both from the standpoint of teaching reading and from the standpoint of the learner. It is hoped that this classification may stimulate an interest in research into the problem, and facilitate understanding of research already done. It is also hoped that teachers may be helped to gain insight into some of the factors involved in the use of various teaching methods and materials.

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THE IMPACT OF TODAY'S STUDENTS UPON COLLEGE PROGRAMS IN READING

The open admissions policy set forth by law in several states and practiced by colleges and universities throughout the United States guarantees to all high school graduates, irrespective of previous attainment, enrollment in a state college of his choice. New York City alone will spend millions of dollars not only for extra faculty and facilities but for remedial, compensatory, counseling, and instructional services designed to aid students to remain in the university until graduation. Furthermore, studies indicate that approximately one-third of all entering freshmen need to develop basic skills in reading so that they can meet minimal requirements for college study. The whole theory of open admissions and compensatory education is being challenged by many educators, governmental leaders, and taxpayers. In spite of this opposition, inadequately prepared young men and women are now enrolled in our colleges and universities, and we are being required to meet their reading needs. This paper will set forth some of the problems encountered in teaching students to read at the college level and some means of dealing with these problems. The impact of today's students cannot be ignored.

MEETING NEEDS OF STUDENTS

Many students enrolling in university classes are reading at the sixth grade level and below. Their speaking, writing, listening, and reading vocabularies are limited, and they have difficulty in securing meaning from class lectures and textbook reading. There has been little experiential background to prepare them for the concepts expressed by teachers and writers in the academic world. In fact, going to college is so foreign to some of these students that they have trouble in registration and in meeting flexible class schedules. Many are lost in a strange and hostile land. In general, these students need stimulation, information, and guidance. They need aid and instruction when and where it is needed for under these conditions they can appreciate the value of the assistance provided for them. The goal-oriented approach is essential in working with these students for the value of any instruction to them is dependent upon their immediate needs. In fact, they do not want to improve their basic skills in reading unless such attainments result in better grades in the university earned with an economy of time and effort. These students want a degree from the university and are not concerned with "getting an education" for that is too vague and indefinite. Some of these individuals have pointed out that much of their instruction in reading has been unrelated to their goals and that it has been worthless to them. Surely, it is obvious that the needs of the students, as they identify them, must be met if we are to continue an open admissions policy.

Specific reading needs

A study of several thousand students on the campus of Western Michigan University indicates that certain learning skills are necessary for successful academic achievement. These are: to identify ideas; to read for a purpose; to make ideas one's own; to make the most of words; what to accept and what to reject; how to skim a textbook effectively; to concentrate; to read different kinds of literature; to read in the field of mathematics; to read in the field of science; to read in the social studies; and to read creatively.

Most of these students are not interested in the application of phonics, structural analysis, and contextual clues unless they see that these approaches to word meaning can be useful to them. This is "old stuff," they report, and are immediately "turned off." Skill-drill materials, practice exercises, and assignments are treated with disgust and in many instances ignored. Students ask, "Can't you show me how to read the books I have to read in my regular classes?" They need help in achieving their goals. In fact, they need facilitators rather than dispensers of information.

Personality needs of students

Conferences with students enrolled in college reading classes and studies of their academic background indicate that many have made no vocational choice and that in their world there is little else for them to do except to go to college. Here they assume that success will be as easy to attain as in the secondary schools where in spite of frequent absences, low test scores, and low marks they were promoted from grade to grade irrespective of attainment. These concepts developed over a period of several years are difficult to eradicate. Observations and individual studies suggest that many students needing special educational services care little about overcoming their deficiencies. It appears that some of these individuals have not learned to do the things that need to be done, when they need to be done whether they want to do them or not. Emotional maturity is a characteristic which many modern college students do not possess.

A large number of students requiring remedial and compensatory services have frustrations, worries, and fears which seriously interfere with their ability to concentrate. Life on our college campuses is not always conducive to the development of adequate study habits. Many students have not learned to adjust successfully to the new freedoms. Feelings of frustration and guilt often prevent effective reading and study. Political, economic, and social unrest along with confrontations and massive demonstrations fail to provide a background for thoughtful reading and study. For some personalities these disturbances retard and prevent academic achievement.

SOME MEANS TO AN END

The greatest impact of today's students upon college reading programs is the change in the role of the reading teacher. If colleges are to exist for all who wish to enter, overcrowding will be common in all classes designed for compensatory instruction, especially reading. Consequently, the one teacher to a classroom concept will be outdated. In fact, team teaching will become a necessity. This instructional procedure involves two teachers equally prepared who understand the reading needs of their students and who work together simultaneously in the application of methods and the use of materials to accomplish a well designed objective. Frequently, one instructor will interrupt the other in order to reinforce a point of view or to illustrate a principle being set forth. At times there will be a give and take of conflicting ideas so as to enlist the support of students on one side or the other of the apparent conflict of positions. In this situation, students are stimulated so as to develop and express ideas of their own. To prove their point some of the students consult reference materials and attain real status by convincing one member of the team that he was in error. Other students are quickened, and critical thinking actually takes place.

Team teaching can facilitate the use of flexible grouping in reading classes at the university level. Students can be grouped temporarily from one to two class periods in order to accomplish a specific objective. For example, a team working with a class of 32 students can demonstrate reading for main ideas in a chapter and vocabulary building at the same time. One group of 12 students would be concerned in learning how to identify main ideas in a chapter and another group of 20 students would be shown how to add words which have been selected from their various textbooks to their vocabulary. It is obvious that such grouping procedures are dependent upon the awareness of the instructors of the students and their needs. Class lectures should be provided chiefly at the request of students.

Team teaching makes possible the goal-oriented approach to instruction in reading. As the student tries to accomplish his objectives with his books, he experiences difficulty and it is at this time and in this situation that he needs specific instruction. Today's student sees little value for instruction before the need for it develops. For him and at this time it is irrelevant and inconsequential. In the goal-oriented approach the function of the teacher is to stimulate, when necessary to inform, and in all situations to guide. Attention must be focused upon the whole individual and his needs and not upon subject matter, materials, and reading skills per se. Teaching about reading can be done away with entirely.

REMEDIAL READING: A THING OF THE PAST

Such terms as remedial reading and compensatory instruction can be and should be avoided. Today's students abhor their connotation and their denotation is lost in a maze of ambiguity. They are like the term hardware which can mean anything from a tenpenny nail to a lawn mower. Furthermore, developmental and remedial reading have much in common for seldom does any individual learn completely and thoroughly at the first presentation. Instead of using the odious expressions, remedial and corrective reading, why not talk about meeting the needs of the individual while and as he uses his books to accomplish his objectives on the campus? Today's student is not interested in Reading as a subject. In some instances programs such as Upward Bound give students an unrealistic concept of themselves, their activities and expectations. They are encouraged to expect an adjustment in curriculum which frequently is long delayed and in other circumstances is never made available. Failure to secure such aid and guidance leads many students to discouragement, frustration, and to acts of hostility. This situation is intensified by the attitude that an education is a right, not a privilege nor an opportunity. In dealing with these students the instructor must create interest and not stand passively by and wait for it to develop.

IMPORTANCE OF CONCEPT DEVELOPMENT

Students of today, who have limited ability in reading, possess a knowledge of words and their meanings which is not appreciated or even understood by many of their instructors. This jargon of the youth, however, does not help him in his identification, interpretation, and evaluation of the concepts expressed in his textbooks and presented to him in class lectures. For the more mature student, this need soon becomes apparent and he is apt to seek help. If he is to read and listen effectively, a knowledge of the unknown concept is essential. He must understand the language of books and the academic community. This is relevant.

The intelligent student in the upper ranges of these classes learns to use concepts expressed in the form of words, in sentences, and in paragraphs when he makes up his mind that it is necessary to do so. He can do this by expressing his ideas in speech and in writing. Later he can listen to and read the ideas expressed by others. Now if his instructors have "stirred him up," "turned him on," and really stimulated him, he will have ideas to express, *his* ideas. His teachers can now guide him so as to bring about effective expression. By the total process of speaking, writing, listening, and reading, concepts can be born. The good therapist with his knowledge of all the tools of his trade can become an excellent obstetrician who is concerned with the birth of one child at a time.

If concepts are to be developed in the various subject matter areas, tutors provided by the departments can cooperate and work with the reading therapist. This reading specialist now becomes a consultant and a teacher of tutors. It is the responsibility of these subject matter specialists to provide experiential background, to develop concepts essential to work in the department, and to aid the students in building vocabularies required in their reading and listening. This will be a new function for the teacher of students enrolled in reading improvement courses.

Not all college teachers can work successfully with disadvantaged students. Some lack patience and are interested in other activities. Others are content to talk about reading and give out chunks of irrelevant subject matter. Many are imperceptive and fail to see with the "third eye" and hear with the "third ear." Such faculty members should be prepared and willing to find othter teaching positions.

SUMMARY

This paper has pointed out and discussed some of the impacts of modern students upon the work in reading at the college level. The goal-oriented approach has been stressed. In this process an emphasis has been placed upon stimulation and guidance. Team teaching carried on by individuals who are dedicated to the task of meeting the needs of individual students has been recommended. The most drastic change is in the role of the reading teacher who becomes a consultant and helps representatives from the content fields develop reading skills in their subject matter areas. He focuses attention upon the whole student and not upon reading, subject matter, and materials. He no longer works in a vacuum but recognizes the need of counselors and cooperation with other members of the faculty. With his students he becomes a facilitator of their activities and not an impersonal storehouse of irrelevant materials.

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DEPRIVATION AND ACHIEVEMENT AS FACTORS IN AUDITORY COMPREHENSION

Several studies have pointed out the relevance of cultural deprivation to the development of certain cognitive abilities. (See Barritt, Semmel, and Weener, 1967; Fowler, 1965; Massad, 1968; or Whiteman Brown, and Deutsch, 1966.) Likewise, several studies have indicated that achievement characteristics among deprived and nondeprived children vary greatly. (See Crosby, 1963; Humphrey, 1964, or Gray, 1965.)

A question then arises regarding the possible differentiation of the contribution made by cultural deprivation to certain cognitive skills and the contribution of achievement characteristics to those same cognitive skills. Since a particular skill, reading, was of paramount concern to the investigator and since potential reading ability could obviously not be measured by tradtitional reading measurement techniques (requiring that the examinee be able to read), related skills needed to be identified. In order for the differentiation of the effects of cultural deprivation and achievement to be meaningful in terms of reading, two criteria should be met. The related skill should be highly correlated with actual reading ability, and should be measurable in instances where reading skill could not be directly measured. A review of the related research indicates that auditory comprehension meets these criteria (Stroud, 1964; Furness, 1967; Austin, 1960; Vineyard and Bailey, 1960; and others).

The intent of this investigation then was to try to differentiate the effects of cultural deprivation and achievement characteristics as they relate to the cognitive skill of auditory comprehension and perhaps by implication to potential reading ability.

The specific null hypotheses tested were as follows:

(1) There is no significant difference on scores of auditory comprehension between groups of achievers and non-achievers.

(2) There is no significant difference on scores of auditory comprehension between groups of deprived and nondeprived subjects.

(3) There are no significant differences on scores of auditory comprehension among sources of auditory materials (i.e., materials produced by deprived achievers, deprived nonachievers, nondeprived achievers, nondeprived nonachievers).

METHOD

Sample Selection

The subjects used in this study were all eighth grade students. Three-hundred eight subjects were screened in the *Wide Range Achievement Test* (WRAT) (Jastak and Jastak, 1965). A subject was considered to be an achiever if the average of his WRAT scores fell within six months of his expected grade level. Twenty-one students were not available for further testing due either to dropping out of school or to being absent on subsequent testing days.

The remaining 287 students were then categorized, according to the McGuire-White adaptation (1955) of the Warner Socio-Economic Index, into deprived and nondeprived groups. A composite score of fifty-two or higher was considered to be deprived. Deprivation status and achievement status were then used to classify the subjects into experimental groups. This classification ultimately resulted in four categories: the deprived-achiever group, the deprived-nonachiever group, the nondeprived-achiever group, and the nondeprived-nonachiever group.

Since this screening procedure resulted in an unequal distribution for subjects by category, a random selection procedure was employed to meet the equal cell requirements of the design. An N of 20 Ss per cell was selected, resulting in a final N of 80.

Materials

The auditory materials were obtained by asking subjects to respond to the six stimulus picture cards of level three of the Peabody Language Development Kit (Dunn and Smith, 1969).

Their stories were recorded as they were told and then typed .Their stories were then externally edited to provide a 500-word passage. No internal editing was done so that the original structure and grammatical usage continuity was maintained within groups. The resulting 500-word passage was recorded using a male narrator. These male-narrated, 500-word passages constituted the auditory inputs.

The auditory cloze test was used to measure the independent variable of auditory comprehension. Other studies which have used the same technique are Taylor (1956), Weaver (1961), Weaver, Holmes and Reynolds (1970).

Procedure

The subjects were individually exposed to a 500-word passage which was broken up into shorter passages of 40 to 60 words each. The passages were presented by means of a tape recorder.

In compliance with the requirements of the fully balanced, fully crossed, repeated measures design used in this study, representatives of all four experimental groups were exposed to auditory materials from each of the four producer groups.

Immediately subsequent to the presentation of the auditory material, an auditory cloze test was administered. The auditory cloze test was composed of the same material presented in the initial exposure. The deletion schedule was an every fifth lexical word deletion. The lexical deletion was chosen over other deletion schedules due to the expressed purpose of the test, which was to measure auditory comprehension. This choice is based on a finding by Ohnmacht, Weaver, and Kohler (1970) in which they stated that "A lexical deletion is considered to sample . . . 'comprehension' because nouns, verbs and adjectives seem to have a good deal to do with such 'comprehension' components as vocabulary [p. 206]." The subjects' answers were recorded by the examiner on a prepared answer sheet beside the appropriate deletion blank number. The number of correct exact word responses were then counted and this number constituted that individual's raw score.

RESULTS AND DISCUSSION

The means and standard deviations obtained by all subjects across selected variables are reported in Tables 1 and 2. Table 1 reports this information for the deprived-achievers (DA) and the deprived-nonachievers (DNA). Table 2 reports it for the nondeprived-achievers (NDA) and the nondeprived-nonachievers (NDNA).

Table 1

Means and Standard Deviations for Deprived-Achievers (DA) and Deprived-Nonachievers (DNA)

Variable	DA		DNA	
	M	SD	M	SD
WRAT Total	9.1	1.2	5.8	1.4
WRAT Difference	1.1	1.2	−2.4	1.2
WRAT Reading	8.7	1.6	5.9	1.7
WRAT Spelling	8.8	1.6	5.7	1.6
WRAT Arithmetic	9.6	2.2	5.5	1.4
D-NA Materials	27.3	4.7	23.7	5.7
ND-A Materials	32.3	4.0	28.4	5.8
ND-NA Materials	36.1	6.5	31.8	6.4
D-A Materials	29.3	5.7	23.7	6.8
Total Cloze Correct	125.7	18.4	107.4	21.9

Table 2
Means and Standard Deviations for Nondeprived-Achievers (NDA) and Nondeprived-Nonachievers (NDNA)

Variable	NDA		NDNA	
	M	M	SD	SD
WRAT Total	9.7	1.6	7.5	1.3
WRAT Difference	1.7	1.6	–2.5	1.3
WRAT Reading	9.6	2.1	5.8	1.6
WRAT Spelling	9.6	1.4	5.6	1.5
WRAT Arithmetic	9.9	2.2	5.2	1.5
D-NA Materials	27.5	4.2	22.3	6.3
ND-A Materials	33.6	5.0	28.6	5.8
ND-NA Materials	37.7	4.4	31.2	7.3
D-A Materials	32.0	4.9	24.7	7.7
Total Cloze Correct	130.8	15.2	106.7	25.0

The similarities in the performance of subjects within achievement groups is striking. The differences in scores among nonachievers, regardless of deprivation status, was minimal. Basically, the same holds true for the achiever categories. The differences are slightly larger on some variables but performances are still highly similar.

Table 3 shows the results of the analysis of variance. Of three main effects, two were significant. Of the four possible interactions none was significant. The two significant main effects were achievement and auditory input materials. The main effect of deprivation status was not significant. Main effect means are reported in Table 4.

Table 3
Analysis of Variance

Source	df	ms	F
Between Subjects	79		
Achievement (B)	1	2,231	10.38*
Deprivation (A)	1	26	1.00
BxC	1	39	1.00
Error	76	215	
Within Subjects	240		
Auditory Materials (C)	3	1,190	18.30*
AxB	3	60	1.00
AxC	3	49	1.00
AxBxC	3	3	1.00
Error	228	63	
Total	319		

* $p < .01$

Table 4
Cloze Test Main Effect Means

Deprivation and Achievement Status*	Achievers	Nonachievers	Deprived	Nondeprived
DNA	54.8	46.0	51.0	49.8
NDA	65.9	57.0	60.7	62.2
NDNA	73.8	63.0	67.9	68.9
DA	61.3	48.4	53.0	56.7

Hypothesis 1 stated that there would be no significant difference on scores of auditory comprehension between groups of achievers and nonachievers. The hypothesis was rejected.

The significant difference between the groups of achievers and nonachievers indicates that factors contributing to the ability to achieve also exercise considerable influence upon the subjects' ability to perform on the auditory cloze test. This difference was anticipated since achieving students would be expected to yield a superior performance on tests requiring academic ability. After all, that is the means by which they are able to be classified as achievers. The nonachievers, for whatever reason, are not as capable of manipulating cognitive abilities concomitant with scholastic success and thus are not members of the achiever group.

Hypothesis 2 stated that there would be no significant difference between groups of deprived and nondeprived subjects and scores of auditory comprehension. The hypothesis was confirmed.

The finding of nonsignificance with regard to deprivation could possibly be due to poor differentiation by the instrument used to measure that variable. However, in view of the nonsignificant fiindings by Entwisle (n. d.), Barritt et al (1967), and others, this finding is not particularly surprising. This is especially true since Entwistle dealt with the major lexical categories of nouns, adjectives, and verbs, the same lexical categories with which the current study was concerned. Further, Barritt et al reported that tasks which required memory for unstructured sequential materials did not differentiate between lower and middle class socio-economic groups. Linguistically structured materials did produce differences in favor of the middle class group. However, they report that immediate memory span is relatively unaffected, for both structured and unstructured tasks, by experiences which are commonly assigned to social class differences. The findings of the current study offer partial support for this finding.

When these points on short-term memory and the unaffected performance of deprived subjects on lexical category language development are considered along with the findings of the current study, Deutsch's (1964) cumulative deficit hypothesis begins to make sense. The cumulative deficit hypothesis is that certain factors associated with deprivation exert a differential effect on cognitive processes and that some processes are more affected than others.

Another factor of some importance should be mentioned in regard to the achiever-nonachiever performance comparison. It was noted serendipitiously that often the achievers, both deprived and nondeprived, would repeat the passage as it was given to them on the tape. In other words, they appeared to try to memorize the word passages and then compare the entire product which they memorized with the subsequent cloze test over the material. This one trial memorization strategy appeared to be very successful most of the time, but occasionally the subjects would get the entire passage scrambled and miss every cloze item. Nonetheless, this spontaneous, self-structured redundancy is indicative of a specific adaptional problem solving learning set and it would ostensibly be helpful in lowering cloze error scores of the subjects employing the strategy. Redundancy has been shown to act as an information reducing device (Carterette and Jones, 1963), and to be helpful in organizational and retrievability memory functions. The failure of the nonachievers to adopt a similar startegy may account for some of the observed differences. It should be noted that no specific measure of redundancy was employed in this experiment and that the above comments are based on observations rather than instrumentation. Further investigations into this area are planned.

Hypothesis 3 stated that there would be no significant differences in scores of auditory comprehension for the experimental groups used in this study as a function of the source of auditory material. This hypothesis was rejected. A predominant difficulty hierarchy emerged which was deviated from only slightly by the nondeprived-nonachieving group. All other groups followed the hierarchy in a highly similar manner. The most difficult materials source was the deprived-nonachiever. The second most difficult source was the deprived-achiever while the third most difficult source was the nondeprived-achiever. Surprisingly, the easiest test was that from the nondeprived-nonachiever source. This finding may simply be the result of the predominant language pattern of the area.

The educational implications of this finding would appear to be that, since deprived and nondeprived children are essentially equivalent with regard to performance on tests of auditory comprehension, this ability should be exploited as much as possible. That is to say, if cultural deprivation exercises only minimal or no influence on auditory comprehension abilities while inhibiting other sensory related skills, then perhaps the other sensory deficits might be remediated through the unaffected ability or the auditory input modality.

A further implication of the findings of this study concerns the previously stated assumption about the positive relationship between auditory comprehension and reading ability. Provided that the assumption is valid it seems reasonable to generalize a bit from the findings of this study and consider the possibility that achievement characteristics are more important in cases of reading difficulty than whether or not the student comes from a deprived background.

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READING ABILITY OF JUNIOR COLLEGE STUDENTS AND READABILITY OF ASSIGNED TEXTS

The old adage, Big oaks from little acorns grow, is quite descriptive of this project. During the first quarter in which Hillsborough Junior College was in operation, the Dean of Instruction requested a readability level of a certain textbook. The students using this particular text has expressed difficulty in reading it. When the Dale-Chall Readability Formula (1948) was applied to this text used in a course designed for junior college terminal students considered unable to pursue academic work, a readability level of 16+ (College-Adult Level) was obtained. Needless to say this text was immediately discarded in pursuit of something more suitable.

Because Hillsborough Junior College was developed as a comprehensive community open-door college to serve the needs of an urban population, three major types of curricula are offered, college transfer, two-year terminal programs, and community service non-credit courses. This curriculum concept demanded that student needs be determined before or shortly after the student's initial orientation. In an effort to identify these needs, the school undertook the administration of a reading test to all students during the first quarter of operation. At this testing session, the Nelson-Denny Reading Test, Form A Revised Edition (1960) was given to a total of 358 students in twenty classes. None of the students were tested more than once: any student who had taken the test previously was excused.

The results of this testing are shown in Table 1.

These figures do not appear inconsistent with estimates made by Hadley (1957) that 95 per cent of college entrants lack adequate study

Table 1
Reading Scores of Initial Population

Reading Grade Scores	N (Total = 358)	Per Cent of Total
13.8	64	17.9
13	44	12.3
10-11-12	120	33.5
7-8-9	115	32.1
-7	15	4.2

skills and that a relatively small per cent have reading speeds and comprehension skills adequate for preparation of their college assignments. After a careful eight year study of entering freshmen, Halfter and Douglass (1958) concluded that two-thirds of their entering college freshmen lacked reading skills required for academic success.

UTILIZATION OF READABILITY LEVELS OF TEXTS

Although no readability levels have been attempted with any materials in music, foreign language, or in any of the business education areas, selections from all other disciplines have been analyzed.

The information concerning the readability levels of texts is used in various ways. For example, in one area of social sciences, the instructor has determined the level of this text and supplementary materials. He administers the reading test each term to his students or obtains the scores on those already tested, and makes his assignments according to the results. For the students with a certain pre-determined reading level, he assigns reading materials and does not require attendance at lecture sessions. Those students who are not considered adequately prepared to read their text material and other supplementary reading assignments are required to attend class lecture sessions.

In another area of social sciences, the instructor has multi-level texts and the student is assigned a text according to his reading level. Incidentally, it is the contention on this campus that a student with a high reading level is just as deserving of attention to his reading needs as is a student on a low reading level.

As stated by Bentley and Galloway (1961), the usefulness of the tool of reading is lost if the material to be read does not reasonably match the capability of the reader. If the material is too difficult, the student will not comprehend; if it is too simple, the student may be insulted and/or bored. In either case, learning suffers.

The readability level of a text is also utilized in the selection of the text for a course. The person or persons responsible for the selection of a text examine and select two, three, or sometimes more copies in which they are interested. The readability level of the text is then determined by applying the Dale-Chall Readability Formula. However a text selection is not necessarily made because of a low readability level. Other factors such as the qualifications of the author, organization of the book, content, presentation, appearance, accuracy, adaptability, illustrations and teaching aids available, may be taken into consideration. Recently, for example, a text in the social science area was considered for adoption. Of the three books finally considered, one was ninth-tenth, one was eleventh-twelfth grade, and one had a readability score of grades thirteen through fifteen. For this particular adoption, the one showing an eleventh-twelfth grade level was selected because summaries were presented at the end of each chapter, study helps were given for the students, and a thorough index was also included.

For some areas of new programs still in the developmental stages, such as Nursing and Nuclear Medicine Technology, the personnel responsible for these programs have used the readability levels of essential textual materials as one criterion for the establishment of requirements in their respective areas.

These examples represent only a few ways in which the Dale-Chall Readability Formula is utilized at Hillsborough Junior College to insure correct individual assignments in appropriate reading material.

TEXTBOOK READABILITY LEVELS COMPARED WITH ACTUAL STUDENT READING LEVELS

The reading level scores for four classes in the social science areas and one English class were compared with the readability level of the required texts. Table 2 presents these data. For each student, a difference score was computed by subtracting the reading level score obtained by that student from the readability level of the text being used in the student's course. It should be noted that the substantial positive value of these differences reflects the general tendency of the texts being used to have a readability level above the reading level of the students using them. The statistical significance of the mean difference observed for the classes was tested by use of the "z" ratio, where the observed differences was compared with a possible zero dif-

Table 2

Comparison of Readability Levels and Reading Levels

Classes	N	Σd	Z
Social Studies	28	45.049	4.335*
Social Studies	29	50.393	4.439*
Social Studies	28	52.046	4.361*
Social Studies	25	39.976	4.082*
English	21	48.538	3.916*

* $p < .001$

ference. The z values for every class indicated that the observed difference was statistically significant. The readability level of the text being used tends to be significantly higher than the reading level of the students using the texts.

TEXTBOOK READABILITY LEVELS COMPARED WITH INITIAL STUDENT READING LEVELS

The readability level of a selection of textbooks used at Hillsborough Junior College was compared with the reading scores of the initial school population.

The results of the textbooks analyzed are recorded in Table 3. Of the twenty texts analyzed, eight had a readability score above the 16th grade level. Less than 30% of the students enrolled in the College would be able to read these texts. Three of these texts, one in electronics, one in data processing and one for a Guided Studies English course are used in terminal courses not considered for academic credit or for students capable of pursuing an associate degree.

Table 3

Dale-Chall Readability Levels of Selected Texts In Various Disciplines

Text	Discipline	Raw Score Average	Corrected Grade Levels
A	Business Administration	10.143	16+
B	Business Administration	13.031	16+
C	Guided Studies English	9.460	16+
D	Communications	8.337	11-12
E	English	9.004	13-15
F	Biology	8.637	11-12
G	Education	8.054	11-12
H	Economics	7.939	10-11
I	Economics	7,692	9-10
J	Political Science	10.534	16+
K	Political Science	10.197	16+
L	Sociology	9.035	13-15
M	Social Science	10.469	16+
N	Chemistry	9.548	13-15
O	Electronics	10.213	16+
P	Latin America	9.598	13-15
Q	Data Processing	10.540	16+
R	Nursing	8.651	11-12
S	Nursing	8.254	11-12
T	Nursing	7.779	9-10

These terminal students are further disadvantaged with respect to their possibilities for supplemental reading. After analyzing 78 pieces of occupational information literature from 24 different sources, two-thirds of which ranked as "very difficult" while another 32% ranked "difficult", Brayfield and Reed (1950) concluded that current occupational information falls far short of meeting the requirements for comprehension and interest although these factors have been suggested for years by persons intimately concerned with the preparation and use of such information.

According to Table 3, of the texts analyzed in the areas of business administration, social science, and political science, none are appropriate for use at the junior college level.

One text analyzed used in a Freshman English class, one in sociology, one in Latin America, and one chemistry text had a readability score of 13-15. Fewer than one third of the students in the initial population group would be able to read these texts.

Furthermore, the appropriateness of these texts is made even more questionable in view of the following comments relevant to application and interpretation of the Dale-Chall Readability Formula:

> The reader's purpose in reading and his interest and background in the subject-matter must also be considered by anyone using a readability formula. To say that a given article on chemistry is comfortable reading for average adults because it has a predicted grade level of VII-VIII, is giving an incomplete picture. For those readers who have no interest or no background in chemistry, the article will probably not be comfortable reading and they may get very little meaning from it. For other readers who are interested in chemistry and do considerable reading in the subject, the same article will probably be most comfortable reading. This difference in ease of reading and comprehension may exist even though both groups of readers have completed approximately eight and one-half years of schooling and have the same general reading ability on a standardized reading test. (Dale and Chall, 1948)

Considering these points, it would be very probable that of this group of students (fewer than one-third), only a fraction would be actually able to read the texts comfortably. Of the texts shown on this Table, only those in nursing, biology, education, economics, and one terminal degree English course appear to be written on a reading level appropriate for over one-third of the students at this college.

CONCLUSIONS AND RECOMMENDATIONS

Of twenty texts analyzed, eight had readability level scores of 16+ (College-Adult Level), practically eliminating the utility of these books at the junior college level. Of these eight texts, three were selected for use by students in non-academic or remedial-type courses.

An analysis of this report seems to indicate that texts used in the lower-level and/or non-credit type courses are written on a more difficult readability level than those used in the courses for college credit.

An additional four texts had a readability level score of 13-15. This readability score encompasses the grade levels (13-14) for junior college transfer credit work. However, one must be cautious in making the assumption that these texts would be appropriate for use at this level. Mallinson (1954) warned that in order to be an effective learning tool the reading difficulty of books must be at least one grade level below the reading level of the students for whom the text is assigned.

The recommendation is made that publishing houses give serious consideration to employing a readability index, student aids, and other factors of readability, and then make these facts known in their advertising literature to prospective purchasers of the materials.

If, as so often expressed, no wholly reliable formulas for grading college level reading material exist, then some action should be taken to arrive at some method for reliable measure for these materials. Numerous attempts have already been made to develop a satisfactory technique for determining the level of reading difficulty of printed materials. Michaelis and Tyler (1951) contended that different formulae may be more suitable for some materials than for others and that there is need for research to determine the most appropriate formula to use with specific types of materials in that present techniques really do not assess the difficulty of the concepts found in the materials. Cosper and Griffin (1967) are in agreement that in spite of the current vogue for reading formulas which try to assess reading ease on a mathematical scale, it is almost impossible to consider word and sentence length in conjunction with content and arrive at fine distinctions in level of difficulty and reader interest. However, it was not the intent of this paper to compare different readability formulas, to discuss the reliability of readability formulas, or to point out the justification for the utilization and application of a readability formula to textual material. As stated earlier, the first obstacle in the utilization of readability formulas is not the grossness of their estimates but that of the lack of employment by people who use printed material for instruction. School people should have the same concern about readability as there is about the reading ability of students. The variability of reading skill of adult level students demands that teachers be knowledgeable about the appropriateness of the materials used for developing content and concepts in their courses.

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IMPLICATIONS OF A THEORY OF READING

In a recent issue of a research quarterly in Reading (1970a), I have proposed an information-processing type model of the reading process as a whole. Under the hypothesis that language has an abstract genetic base, a model is developed that heavily depends upon recent work in phonology by Chomsky and Halle (1968). In particular, it is proposed that the abstract base forms for lexical items bear a remarkable resemblance to the orthographic representation of English, and that the native speaker of the language makes extensive use of his knowledge of these forms in developing efficient strategies for reading Specifically, it is suggested that an acceptable oral rendering of a passage involves greater syntactic and semantic understanding than is presently thought to be the case. The model makes the assumption of normal oral language development and proposes that analysis-by-synthesis processing of articulatory coding provides considerable insight into how children begin to read. The central process of reading is a relatively simple transition from orthography to an abstract articulatory feature representation in STM (short term memory). In other words, learning to read ought not to be a particularly difficult task for the essentially normal child if the language is appropriate to his present level of competency in a particular dialect.

In more recently completed research (Brown, 1970b), following the work of Goldman-Eisler (1968) and others who have suggested that pause time may act as an important structural clue in the encoding and decoding of speech, I have demonstrated that 65% of the pause time variance in a competent oral reading performance can be predicted from both surface and deep structure analyses of the textual material. Interestingly enough both levels of analysis are necessary for this predictive equation. These results clearly support the Chomsky-Halle hypothesis that an acceptable oral reading is dependent upon an understanding of the derived surface structure of the passage read. The syntactic variables of this experiment were successful in not only predicting the occasion of the pause, but also pause duration, thus supporting the presumption that the distribution of pause time in oral reading is largely predictive of underlying and derived grammatical organization.

If the transition from orthography to the abstract feature representation *S* is as straightforward and direct as it appears to be for the individual who knows the sound pattern of English, how do we account for *reading* difficulties in otherwise intelligent children. There are four kinds of problems I will mention here; they can be characterized as: peripheral; neurological or specific; cultural; and developmental. Together they comprise the main body of impediments I would want to associate with reading.

Peripheral difficulties can be quickly dismissed as those physiological problems of inadequate vision or hearing that are quickly diagnosed as such by a competent reading clinician. Neurological or specific reading disabilities refer to those few problem readers for whom no functional problem can be detected. Rather, the cause may lie in diagnosed brain damage, or in the absence of such evidence, a lack of visual or auditory memory, little or no directional sense, or the phenomenon of delayed or backward speech (see Shankweiler in Kavanagh, 1968, pp. 202-204). All of these neurological symptoms have fallen under the general heading of dyslexia, and they all indicate some disturbance in the perceptual or visual-auditory link. At some place in the first few steps of the reading process, the relatively direct transition from text to *S* malfunctions and the print is never recognized as language capable of interpretation. Remedial action for these problems is presently a bafflement, and probably will continue to be so for some time.

Cultural problems are those difficulties peculiar to reading populations where the individual is not only attempting to read, but also must attend to the problem of trying to understand a written dialect that is quite different from his own. This is not simply a question of the so-called differences between written and spoken English, nor is it concerned with minor dialect differences in the phonetic rendering of the same underlying base forms of words; rather, it refers to the intrusion of one culture upon another, where the semantic and structural space of the spoken "dialect" is so different from Standard English, its cultural roots so uniquely its own, that we may indeed find that the underlying base forms are distinct from other English dialects (see Baratz and Shuy, 1969). If this is the case—and it appears to be so in many inner-city schools—then beginning reading will present enormous problems for the child attempting to read what appears to be a dialect not unlike his own, but which in reality is profoundly different at every level.

Finally, there are those difficulties associated with oral language development. Knowledge of the sound pattern or phonological rules of English depends not only upon developmental sequencing, but also upon the availability of evidence. If the child is attempting to read a vocabulary that is greater than or different from his own, then he is again confusedly trying to accomplish two things at once. The dialect may be his own, but he is unable to integrate these new terms with his phonological system. So instead of the child beginning to translate or decode his own language, he learns to read textbook simple declaratives using concepts or vocabulary he will learn while reading. Why should conceptual growth or vocabulary development have anything to do with "learning" to read? Meaning or interpretation aside, it more importantly confuses the child's phonological system.

Specifically, it seems to me that we have two choices in teaching children to read. We can either delay the introduction of reading until the child's vocabulary and oral language development are in line with the expectations of school and textbook language, or we can teach the child to read the language he knows. If we take the first choice, then the first task in school probably ought to be "oral language development", concept-building, etc., all the activities presently associated with the basal approach to "reading development", however, here divorced from the act of learning to read. Why not read aloud more extensively to children: why not develop all those "listening skills" that are so conspicuous by their absence in literate adults; or why not systematically exploit the system of understanding, inference, and interpretation, allowing children to really interact with this expanded and revised dialect through playlets, conversations, and oral interpretation. In other words, let them know the language before they must read it.

The second choice of reading activities would require rather specific knowledge of the language or dialect(s) of the children about to begin reading. What is the structure of their lexicon, and with what phonological and syntactic rules are they competent? These are areas which require considerable research that is yet to be forthcoming for many dialects. For example, how do children's phonological rules and methods of representation change with development over time, within one particular dialect? If we also want to emphasize the alphabetic principles of the language, then we will want to begin with those letter patterns of syllables and words that are regular for this child's knowledge of his dialect. That is, we may choose to begin with those words or syllables from words where there is minimal change from the underlying base form to the phonetic rendering in the dialect. Such a thoroughgoing analysis and systematic presentation of the regularities in Standard English at the phonemic level was devised by Leonard Bloomfield, the great American linguist, some 35 years ago. Needless to say it did not meet with instant success and was finally published in 1961 by Wayne State Press. May I add that to my mind it remains the best single book on teaching children to read their own dialect, and that most of what I have said is derivative of his insight into the problem.

He, too, thought there should be no great difficulty in learning to read, if reading and language problems were understood as related but distinct. The transition process from written to oral language that the child knows, should be mastered in a matter of months no matter how badly taught or with whatever learning principles in mind. Every normal child comes to school with well-developed oral language; the problem of accessing that language orthographically should be a straightforward task if based upon alphabetic principles and the notion that regularities in this decoding process should be presented in a systematic fashion. Given time and attention, any normal child should learn to read the language he knows. It is a rote process which only requires the proper selection of material and some kind of internal comparison for the child as to the acceptability of his rendering—altogether a task admirably suited to the long awaited use of computer-aided instruction; as I believe most teachers, besides finding the task extremely repetitious, even with knowledge of a child's dialect would be overly critical in their acceptance of his rendering. If the child later is encouraged to understand what he has read, that is all well and good, as we hope he will learn to understand all that we tell him as well. But to ask him to attempt both in the early stages of reading is to divert his attention from the principle task at hand—learning to read. In a remarkable display of flexibility most children learn to read no matter what method is invoked, but not without considerable confusion and effort, and not without, in many cases, considerable loss of self-respect and confidence. Nothing is perhaps more disquieting than the spectacle of a teen-aged boy who is finally learning to read, but at a point where the school process, with its fundamental premise of literacy, has passed him by. Or perhaps from my own experience, to learn that the first grade instructor of my son has, by the third week of school, established four reading groups "to meet their individual needs", and promises many of the parents that their children will not "learn" to read this year because they lack the necessary background of language experience in the home. What has become of the democratic ideal in our public schools, that all children have the right to learn to read?

Finally, if I seem to unduly emphasize the role of oral reading in the beginning steps of acquisition—its importance to further processing, its role as indicator of understood structure, its realization as subvocalization which should not be discouraged—I do not mean that we should return full circle to the exclusive interest in reading aloud that characterized instruction at the turn of the century. Thorndike in 1917 knew the fallacies in this approach when he wrote:

> In school practice it appears likely that exercises in silent reading to find the answers to given questions, or to give a summary of the matter read, or to list the questions which it answers, should in large measure replace oral reading. The vice of the poor reader is to say the words to himself without actively making judgments concerning what they reveal. Reading aloud or listening to one reading aloud may leave this vice unaltered or even encouraged. (p. 332)

In a sense, the history of reading education since that time has taken Thorndike's recommendations to heart, but in the process there has developed considerable confusion over what is reading and what is language development. Children were taught to "read for meaning" from their very first contact with print, and consequently were taught to do several things at once, as a mature reader might do. To read a passage is one achievement, to understand what one has read is another, based upon adequate attainment of the first.

One of the most vexing problems that has resulted from this great emphasis on silent, "meaningful" reading, is the lack of accuracy one detects in the reading of students in learning situations. Closer inspection of their reading (learning) problems reveals that they simply cannot be faithful to what is on the printed page, because they are sampling the text in a haphazard fashion and guessing at many of the key concepts or vocabulary items in the passage. How to promote accuracy in reading seems to me one of the essential problems as children begin to read. The whole area of the decision process as to what will be acceptable as a generated match ought to be a very fruitful line of investigation. And finally, in the area of testing, I fear all tests of reading efficiency and retention are doomed as measures of the underlying reading process. Better that we move to something as simple as the "cloze" or word deletion test, before we accept reading comprehension evaluations as indicative of a child's reading competency.

Every child has the right to learn to read. If he is normal, can speak and listen, has no serious physiological or neurological problems, he can "learn" to read the language that he knows in a relatively short period of instruction. The child has the right to expect that of us. If we fail him, then we have only ourselves to blame.

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1970 REVIEW OF RESEARCH ON COLLEGE-ADULT READING

For the most part, the reports covered in this present review of research in college-adult reading are ones which have appeared since September, 1969, and through September, 1970, a period of time comparable to that covered by last year's review (Bliesmer, 1970) and previous ones. Several earlier reports which were not available at appropriate times to be included in previous reviews and several others which had been unintentionally overlooked before have also been included.

The number of reports included as relevant ones for this year's review is slightly less than the 180 found relevant for each of the last two years' reviews. This is largely because the proceedings of last year's Conference (Schick and May, 1970) were not published in time to be included for coverage by the present review. The Yearbooks of this Conference have, in the past, been one of the major sources for pertinent reports. Published proceedings of the last IRA Convention were also not available in time for inclusion. The reports have again been organized under the five major headings used in previous reviews.

PROGRAMS

Surveys

Results of a review survey, by Bednar and Weinberg (1970), of twenty-three studies of influence of various guidance or counseling programs for underachieving college students included indications of the effectiveness of counseling in conjunction with an academic studies program (such as how to study or remedial courses). Results obtained with Harvey's questionnaire survey (1970) of community colleges in the State University of New York indicated that eighteen of the twenty-one responding had some kind of reading service, with eleven having remedial reading, eight having developmental reading, and four having study skills (and only one having "speed reading") programs. Only two offered programs for academic credit. Thirty-five percent of the forty United-Presbyterian-Church-affiliated colleges responding to Peck's questionnaire (1969) offered remedial English, with only two giving it for credit. Responses obtained from seventy percent of the nation's public and private community colleges, in a survey of American community colleges made through the National Association for Foreign Students Affairs (Grafton, 1970), revealed that special procedures for foreign students were arranged by few colleges, that English proficiency and finance status were expressed as major problem areas, and that special English programs were offered by "only a handful" of colleges. Cass (1970) presented a list of recommendations and conclusions with regard to television programs for teaching adult illiterates, based on a study of the literature on adult education and television series for illiterates and case study of "Operation Alphabet."

Specific Program Evaluation

Bahe (1969) examined the effectiveness of a summer program of reading and study skills with two groups of University of Wisconsin (at Milwaukee) "high potential" freshmen. The groups made significant gains in Iowa and Cooperative test scores; but retesting approximately one semester and two semesters later revealed rate as the only significant permanent gain; and grade-point averages of both groups for one or two semesters after the program were lower, but not significantly, to those of control groups. In a program conducted at Quinsigamond Junior College with all students scoring below a twelfth-grade level on a reading test, and in which the overall skill of communication was taught with a team-teaching approach, the average reading grade-level (Nelson-Denny) of the group was reported to have been raised from 11.1 to 11.8 (Brown, Watson and Bowden, 1970). Manzo (1970) described a program at Syracuse University which included adults as well as children and in which a procedure of reciprocal questioning between students and teachers was used to promote subjects raising their own questions and setting their own purposes for reading. Post-evaluation results indicated that the questioning group scored significantly higher on a reading comprehension test and on number of questions asked than did a "directed reading activity" group, while the latter group had significantly higher vocabulary test scores. In appraising objectives and validity of a reading course designed to be suitable for presentation to junior college freshmen, Schoenberg (1970) found significant *Nelson-Denny Reading Test* score gains for students at the end of the program; however, no significant differences were found between grades in English courses taken the semester before the program and English course grades the semester following the program. Teachers participating in a reading improvement program described by Stuart (1967), as an integral part of an NDEA institute in reading at Ohio University, made significant increases in *Nelson-Denny Reading Test* rate and vocabulary scores.

Evaluation of the remedial program of Miami-Dade Junior College, North Campus, led Losak (1970) to conclude that the program was not effective in raising grade point averages to a "C" level or in influencing student withdrawal, had not effected reading test scores higher for remedial program participants than those of a randomly selected control group, and did not result in a significantly higher proportion of passing grades after one semester of remediation. A group of University of Pennsylvania freshmen who had received individual study counseling at the University's reading clinic were reported by Lesnik (1970) to have had significantly higher grade-point averages at the end of the year than did a control group who did not receive study counseling. Ho (1970) found that changes in study habits and attitudes (Brown-Holtzman) of an experimental group of foreign students who had participated in a series of counseling sessions was significantly greater than those of a control group; but follow-up eight weeks later showed no lasting effect of the change; nor was there found a correlation between change in study habits and attitudes and grade-point average.

Grant (1968) evaluated a University of Utah pre-admission program for students who fell below the required high school grade-point average for admission, which program could take one to three quarters for successful completion, including satisfactory performance in none to three remedial courses. After four quarters of the program, slightly over one-fourth of the 1,040 students entered became eligible for matriculation; and slightly less (22%) actually enrolled. Grant concluded that ". . . a pre-admission program makes a small and possibly dubious contribution to the post-high school education of high school graduates of low academic promise [p. 324]."

English Programs

Benson (1970) described the Florida Inter-American Learning Institute (FILI) at Tallahassee Junior College. FILI is a comprehensive program with intensive instruction in English language training in a cultural orientation set up for Colombian students. The program, in which approximately four classroom hours per week were devoted to reading and writing, was judged to be successful on the basis of "feedback from many Florida junior colleges in which former FILI students were enrolled", "many letters . . . received from former students", and "increasing number of referrals former students are giving to their friends and relatives back home [p. 38]." Colorado State University students in an experimental remedial English class were given assurance by a counselor that they had good potential for achievement in English while a control group was only thanked for participation in the study. Students in the larger experimental class made significantly lower grades in the course than did a control group, while in a smaller class the differences were not significant. Results were interpreted as possibly indicating that counseling resulted in reducing anxiety, which then led to poorer performance (Beyer and Oetting, 1970). Childers and Haas (1970) found that students in a section of college freshman English, at the University of Wisconsin (Milwaukee), who had been given periodic supervision and extensive correction and comment as an aid to writing more effective research papers, did not produce more effective papers (as judged by course grades) than did students who had not received such aid.

Adult Programs

Panes (1970) has reported the preparation of a television reading improvement series of lessons for adults reading on junior high levels, the series having been based on the writing of a model lesson and the resulting evaluations and recommendations obtained from a panel of judges. Various groups of Procter and Gamble employees, participating in a MIND program, a twenty-week basic skills program in mathematics and in reading and other communicative skills, were reported by Mollenkopf (1969) to have made, in general, significant gains (the groups having been at elementary to lower high school skill levels at the start). Becker (1970) described the language experience approach carried on with four illiterate trainees at a women's Job Corps center. Various formal and informal measures applied after approximately a year reportedly indicated substantial achievement gains. Goodman (1969) reported an average reading growth of one year in forty instructional hours in the Wilmington Basic Education Program intended, in part, to prepare students for high school diplomas or the equivalent, with a diminishing of growth rates as fourth-grade level competency was approached. Both groups of Los Angeles Spanish-speaking adults, one using ita and the other TO in a community adult school, made significant reading test score gains, but not significantly different gains (Robinson, 1969). Leffingwell (1969) found that a group of naval recruits reading at approximately third-grade (functionally illiterate) levels made noticeable gains in self-esteem and self-confidence (but reported feelings toward the Navy became less positive). Reading improvement was reported to be "greater than anticipated" but did not reflect as much growth as was noted informally by instructors.

Program Comparisons

According to Dubois (1969), two experimental groups of Northwestern State College (Louisiana) freshmen in reading improvement classes, one using "general reading materials" (*College Reading Manual, Range of College Reading*, and *Listen and Read—Advanced Edition*) and the other using "subject matter materials" (*SRA Reading Laboratory* IVa, EDL *Controlled Reader Junior*, and *Better Reading Book*), both made significant gains at the end of thirteen weeks on cloze test and reading test scores, and significantly greater gains than did a control group. Finding no significant differences between the two experimental groups led Dubois to conclude that "in order to improve the textbook comprehension of college students, it makes little difference the type of materials one uses (p. 166)." Foreman (1969) found that a group of students who participated in a typical study skills program in combination with a self reinforcement treatment did better on several measures, including reading test and study habit scores, than did several other program groups (which, in order of success, were study skills group, operant conditioning group, and control group). Hampton (1969) found no significant differences between comprehension scores (California Reading Test) of freshmen students in a Kentucky college remedial reading class taught by use of multi-level materials (assigned on basis of Nelson-Denny scores) and scores of a group taught by use of mono-level materials (eleventh-grade level), after 15 instruction sessions. Roberts (1970) found that none of three different practice schedules for male college reading program students (practice sessions varying from 3 to 5 a week and from 30 to 50 minutes in length) produced significantly more superior reading achievement scores; but all schedules were found to produce results superior to those produced with no practice. An experimental group of Metropolitan State College (Denver) students who scored low on entrance tests and who had received remedial reading help in a traditional classroom program had significantly higher grades the next quarter than did an experimental group who had received reading help in a self-help laboratory setting in which other students served as supervisors; but differences between grades were not significant the following quarter (Yuthas, 1969). Persistence rates of the experimental groups were significantly greater than those of the control groups.

Khatena (1970) found indications that training with each of four thinking strategies employed with 100 University of Georgia students produced improvement in thinking creatively with words (as measured by two tests developed by the investigator). Whitehill and Jipson (1970) found that "introverts" and "extroverts" (Eyesenck Personality Inventory) did not differ in "traditional method" programs but did significantly (favoring extroverts) in experimental programs which utilized instrumentation beyond that found in traditional programs. Thompson and Whitehill (1970) interpreted differences in practice material rate gains made in three weeks by three flexibility levels of University of Wisconsin reading program participants as substantiation of the hypothesis that greater rate gains would be made by more flexible readers. Both of two groups of University of Kentucky male underachievers receiving counseling help, one by means of group counseling, the other by behavior therapy procedures, and both receiving practical suggestions for improving academic skills, made significant gains in grade-point averages; but qualitative differences were found between the two groups in changes on anxiety and fear variables (Doctor, Aponte, Burry and Welch, 1970). No clear superiority was shown for any of the three group counseling procedures (model reinforcement counseling, desensitization counseling, and group counseling) on study behavior performance of 87 University of Calgary freshmen requesting assistance, out of the 500 to whom counseling was made available; but results indicated that counseling procedures were more effective than no counseling (Jones, Trimble, Altman, 1970).

Dornish (1970) who compared achievement of an experimental group of functionally illiterate adults who had participated in a face-to-face program in which instructional television had also been used with that of a control group who had participated in a summer program without television, found no significant differences between the groups in auditory comprehension, reading vocabulary, and reading scores. Young adult illiterates made significantly greater gains than did older subjects. Comparison of reading test score gains of Oregon Job Corps women who received individual, small group, or regular remedial reading class instruction for forty sessions revealed no significant differences among mean scores (McCall, 1970).

Listening Programs

Grasty (1970) found both experimental groups of college students in public speaking classes, one group having received 20 direct listening lessons and the other having 10 speaking skill lessons which were designed for indirectly improving listening skills also, made significant gains in *STEP Listening Test* scores (while control groups did not); but neither method appeared to improve ability to listen to and to comprehend lecture-type materials once students were out of the experimental situation. In a training program in listening reported by Stroh (1969), with experienced industrial salesmen, both a group in which a video-tape feedback (of a simulated selling session) method and a group in which audio-taped feedback was used made significantly more score improvement in several listening areas than did a control group; but neither group improved significantly more than the other. Barabasz (1968) found no significant differences in immediate or delayed retention test scores between the control group of college students in human behavior and development classes who had listened to a regular class lecture and two experimental groups, one which had listened to a tape-recorded presentation of the lecture and a second which had listened to a tape-recorded version presented at a rate one-third faster than the actual presentation.

READING, STUDY, AND RELATED HABITS, TRAITS, AND SKILLS

Among findings obtained by Anderson (1970) in an investigation of characteristics and attitudes of students in sixteen Kansas community junior colleges were that 46 and 36 per cent, respectively, of almost 8,000 students responding rated themselves as "average" or "somewhat above average" with regard to willingness to spend more than ordinary scheduled time to completing a given task; 58 per cent and 24 per cent, respectively, on questioning truth of printed statements made by persons in authority; 45 per cent and 27 per cent, respectively, on public speaking abilities; and 54 per cent and 18 per cent, respectively, on writing ability.

Analysis of logs of weekday communicative activities collected in a questionnaire survey of 400 randomly selected San Diego adults (Samovar, Brooks and Porter, 1969) revealed that "high communicators" were, in order, administrators, salesmen, students, teachers, and professionals; farmers, housewives, clerical workers, skilled craftsmen, and retired people ranked low. Highest speaking time was logged by salesmen, teachers, and administrators; highest listening time by administrators and students; and highest reading time by retired people, students, and engineers. Reading was logged lowest by 50 per cent of the group, with only engineers logging it as highest; approximately two-thirds of respondents' waking hours were devoted to exercise of speaking and listening skills.

Ames (1970), applying an earlier established classification scheme of contextual aids to incorrect responses of college students obtained in the earlier study, found "words connected or words in series clues" as the most frequently used aid but the one with lowest success, with "question-answer clues" yielding a high percentage of success but being used rather infrequently. Kirkman (1967), after giving vocabulary tests to 2,000 first-year students at Southerin University, found Arts students scoring highest, Social Science next, Pure Science at the middle, and Applied Sciences and Agriculture students lowest. Gifford and Somer (1968), in an interview survey made in dormitories on eight different college and university campuses, found approximately the same number of students studying on beds as at desks, with no differences between grade-point averages of the two groups. They suggested that consideration be given to softer and more comfortable furniture in study halls and libraries.

Among findings obtained in a study (Herrmann, 1969) of factors associated with success or failure of 131 freshmen students on educational opportunity grants at Northern Illinois University were that inner-city high school students were inadequately prepared to do college work and needed to do remedial work in reading, mathematics, and English; that students who had graduated from 80-per-cent-Negro high schools scored significantly lower on the *Davis Reading Test* and all parts of the *American College Test;* and that those who received grade-point averages of 1.8 or lower at the end of the freshman year did not know and had not developed good study habits during the freshman year. A survey study (Froe, 1968) of the 1967 Fall freshman class at Morgan State College (predominantly Negro and considered, in general, "culturally disadvantaged") and freshmen enrolled in several other institutions which were predominantly white, during the same period, found 60 and 55 per cent of Negro and white groups, respectively, preferring "mostly assigned" to "mostly independent" work. Approximately 30 per cent of Negroes and 40 per cent of other students felt their high schools had taught them little of how to study. Among recommendations made by Dotson (1970), after a study of various characteristics of Appalachian members of Morehead (Kentucky) State University freshmen, were that an "Upward Bound" type of program should be instituted for high academic-need disadvantaged students, one that would include pre-freshman year remedial work.

When 55 freshmen who were first to apply for junior college admission (Marshalltown, Iowa) were compared with the last 55 to apply, Jackson (1970) found significant differences favoring the early group in English test scores and in overall reading ability. Finch (1969) has pointed out that more than half of two-year college students are in need of remedial or "compensatory" programs.

Data collected by Yarington (1967), from freshmen university students on time chart forms in which students kept records of all reading they did for a week, indicated considerable variation in hours of reading per week, with means ranging from 10 to 21 hours. Analyses and profiles resulting in a study carried out by Belson and Barban (1969) to determine whether "inner-directiveness" and "other directiveness" (Riesman's theory of social character) was related to exposure, exposure extent, and preferential feeling of each of 20 popular consumer magazines, indicated rather clearly that social character is not significantly powerful in invoking reading frequency or magazine preference.

In Atwood's study (1970) of prediction of preference for newspaper stories involving both editor and newspaper staff views and subscriber views, staff and subscriber selection patterns were found to be rather similar, with "impact" and "conflict" the most preferred news element. Poorest prediction of subscriber preferences was made by those holding desk jobs. Among indications yielded, as a result of analogies made by Patterson, Booth and Smith (1969) of reactions of groups of scientists, educated non-scientists, and communicators to a 4-page facsimile paper with considerable science-type content were a genuine interest in science and considerable reading on the part of a considerable portion of participants, with general agreement among groups with regard to preference for articles pertaining directly to people and general rejection of straight news articles, and a lack of consensus with regard to preference for a science page. Rarick (1970) reviewed evidence obtained through earlier interviews indicating that women read more newspaper content concerning the home and family while men read more content concerning matters considerably removed from the home. Cole (1970) has pointed out an increase in the number of English language newspapers in non-English speaking countries in recent years, with 150 currently being published and with 100 of these having bee[illegible]ted since 1930 and over 25 since 1960. Roeder's study (1969) of leisure reading habits of female teachers and non-teachers was treated in last year's review.

Clarke and Ruggels (1970), in their interview study with a sample of Seattle householders, used a sample of specific news items rather than the more usual global questions and found indications that TV was much less preferred than earlier studies indicated as a chief information channel. Radio and television were mentioned more often than magazines as a source for international news but less often than newspapers; broadcast media were picked even less often for national affairs. Among conclusions reached were that persons depending most on broadcast media have "low education and average or below-average knowledge and interest in public affairs; these media achieve their greatest impact during times of heightened political activity [p. 470]."

Mishra (1970) found greater mass media use by groups of Greater Delhi (India) residents than was anticipated on the basis of UNESCO data. Approximately 40 per cent read one or more newspapers at least once a week, with even 12 per cent of illiterates joining groups where newspapers were read aloud. Radio was the most popular medium used among Bastie dwellers (68 per cent listening at least once a day). Twelve per cent viewed television somewhat frequently; and 11 per cent and 8 per cent, respectively, read magazines and weeklies. Schnieder and Fett (1970) found Brazilian farmers made much greater use of radio sources than newspaper sources for the limited credit information they possessed; but they also found little of credit content value in newspapers. A study by Smith (1970) of characteristics of the U.S. audience listening to international broadcast via shortwave radio found listeners still to be considerable, with audiences characterized by greater proportion of males, college educated, and professional and skilled occupations.

Palmer (1970) studied eye movements of adults and basic adult evening classes reading at three different levels, from third grade to tenth grade. He found fewer eye movements at more advanced reading levels only when total fixations, including regressions, were considered; but no significant differences among levels were found for number of forward fixations, with subjects at all levels tending to examine words letter by letter. Tobin (1970) cited figures, reportedly based on UNESCO data, to show that the world population increases each year at a rate of 7,000,000 and that over 800,000,000 are now unable to read and write; but the actual percentage of illiterates has declined from 44 per cent in 1960 to 34 per cent in 1970.

Bazik (1970) found that groups of male junior college students who sought counseling scored lower on ability (Otis) and academic achievement tests (including *Nelson Denny Reading Test*) than did a group who had not sought counseling; and a group which had volunteered for counseling scored lower on the measures than did a group who had sought individual counseling. Lesnick (1970) found many of the University of Pennsylvania students in a counseling group to have consistent difficulty in approaching reading and study as a thinking process. Chang's study (1969) of over 500 underclassmen in a predominantly Negro southern college, a majority of whom were enrolled in the college's remedial program, found non-remedial students receiving higher critical thinking (Watson-Glaser) scores than did remedial students of both sexes, with females of both groups scoring higher on the "dogmatism" scale than non-remedial males of both groups and non-remedial males scoring higher on "independent judgment" than remedial males. Abney (1970) found no significant differences in mean creative thinking scores between a group of University of Arkansas juniors and seniors enrolled in an honors program and a non-honors group with a comparable grade-point average, nor between means of the non-honors group and a control group with lower grade-point averages; but significant differences between means of the honors and the control group were found. In a comparison of groups of Temple University students with one another and with other students, Eisenman (1967) found English majors scored significantly high and Business majors significantly low on measures of creativity.

According to Cleveland Amory (1970), in one of his "Trade Winds" columns, the instructor for the developmental reading program at a well-known university obtained answers from students in a current events quiz which included the following identifications: Patrick Moynihan as an instructor at Notre Dame, Gil Hodges as a comic strip character, David Kennedy as Notre Dame student body vice president, Bobby Seale as a singer, Abbie Hoffman as the writer of the syndicated "Dear Abby" column, Clement Haynsworth as a football player, and Golda Meier as a "Laugh-In girl".

Influence of Reading, Study, and Related Habits and Skills

Indications of the importance or influence of reading, study, and related skills and habits were obtained in a number of reported studies. Not all indications were positive. Several reported prediction studies have some pertinence for this area.

Brown-Holtzman SSHA scores of University of Texas engineering freshmen were not found, by Gallessich (1970), to be among the ten "most efficient" predictor variables for academic success. In a study of factors affecting scholarship of Pennsylvania State University undergraduates living in fraternity houses, Rhodes (1969) did not find study habits (Brown-Holtzman) to be significant as a predicting factor. However, among higher attributes of successful (in upper third on grade-point average) beginning engineering students at Tri-State College (Indiana), compared with an unsuccessful group, were better study habits (Brown-Holtzman scores) (Gelhausen, 1970). Bradshaw (1969) found the effectiveness of several tests, including the NDRT, in predicting academic achievement of college of engineering students at Oklahoma State University varied from group to group, being most effective in predicting successful engineering students and least in predicting for engineering technology students. *Cooperative English Test* scores (Vocabulary and Reading) were among several variables found by Husemoller (1969) to be heavy contributors to prediction of academic success of Eastern New Mexico University freshmen. Russo (1969) concluded that of the various prediction of variables he studied the best single predictor of academic achievement of students in Arizona junior colleges was ACT English score.

Expectancy tables constructed by Carbuhn (1970) as a result of his correlation study of factors in successful completion of General Educational Development programs by Utah Job Corpsmen suggested a minimum (*Gates Reading Survey*) grade score of 7.0 for pre-GED screening purposes and a minimum SAT paragraph meaning grade score of 7.0 for success in passing the GED Literature test. In their study of procedures for identifying and analyzing disadvantaged students, Clarke and Ammons (1970) found cognitive factors to be significant predictors for academic success for all groups of St. Petersburg Junior College entrants studied—except in the case of Negro males. Rainwater (1970b) reported that research by the General College, Eastern New Mexico University, has shown that the twentieth percentile on the *Diagnostic Reading Test* is the absolute minimum for predicting academic success. Feuers (1970), studying the relationship of reading comprehension scores (Davis and Nelson Denny Tests) to achievement of junior college students in eight different curricular areas, found significant differences among the areas for each of the reading comprehension measures; significant differences between males and females were in general not found; significant relationships between vocabulary scores and college grade-point average were also found, but not sufficiently for adequate prediction purposes. A comparison, by Munday (1968), of transferring terminal junior college groups in three states showed ACT composite mean scores consistently higher for transfer students; but differences were "not great". The highest relationship to grade-point averages of junior college transfer students at Florida State University was found, by Nickens (1970), to be with junior college grade-point average, with the correlation with *Florida Twelfth-Grade Tests* total scores being next, but considerably lower. (The English scores of the latter tests were correlated almost as highly as were the total scores.)

"Skills acquisition at the subfreshmen level" and "learning how to teach reading as a basic skill" were expressed as important concerns of junior college teachers in a Carnegie Corporation-subsidized national study (Shugrue, 1970) of English in junior colleges, with one-third agreeing "that all English teachers have some responsibility to improve the reading skills in their classes." Worsley (1970) found ACT English scores, with a correlation of .340, only slightly lower in correlation with first semester grade-point averages of Arizona freshmen than the most significantly related variable, high school grade-point average.

Curris (1970) found poor study skills among the characteristics marking University of Kentucky fraternity pledges who experienced greatest academic decline during the pledging period. Hackman and Duysinger (1970) reported that among reasons given, through questionnaire responses of students and parents, for withdrawal of over 1,100 students from three liberal arts colleges was "my study habits are poor." Dropped male and female groups were highly dissatisfied with advisement and scholastic habits, while persisting males and females were highly satisfied, in Robinson's study (1969) of factors in the persistence or dropping of 2,800 University of Illinois students. Persisting males expressed high dissatisfaction with counseling (which included help in remedying inadequate study habits) and study arrangement factors, while dropped males expressed high satisfaction with these. The study habit scores (Brown-Holtzman) of California State College (Fullerton) freshmen withdrawers and persisters did not differ significantly, although those of withdrawers were lower and differences approached significance (Russell, 1969). A group of Princeton probationary students did not differ from matched students in the degree to which they attributed their academic difficulties to improper studying, failure to follow a study schedule, and distractions (Smith and Winterbotttom, 1970). Lin and McKeachie (1970) found that groups of low and high anxiety introductory psychology course students did not differ significantly, in general, with respect to grade and criterion test scores; but they found that, in general, students with high study habits scores achieved significantly higher grades than did the groups with poor study habit scores.

On the basis of questionnaire responses obtained in a follow-up study of 1940 Champaign (Ill.) High School graduates, Dahl (1970) concluded that communicative skills courses were among the courses which appeared to have considerably more value than many others were willing to concede. English received a rating by respondents as the most valuable single course taken. (Business Education and Mathematics were the only other courses receiving any appreciable mention.) Among factors found significantly different by Killian (1970) between persisting and withdrawing students in an adult high school laboratory program was reading achievement level (as measured by *Reading for Understanding* tests). Anderson (1970), reported that *Nelson-Denny Reading Test* scores were one of the only two variables found to be significantly different between groups of voluntary and involuntary counseling clients studied at Thornton Junior College (Arizona), with the involuntary group scoring higher than the other group. Pope (1969) described an educational program for adult American Indians from Wyoming and Montana, at the University of Montana, in which students continue until achievement levels are high enough to qualify for vocational school, for which eligibility requirements include being able to score between fourth and eighth grade levels on the *Nelson Reading Test*.

Abel (1969) found that elements were omitted from stories more by those students in elementary reporting courses who did not take notes, after listening to a taped, 7-minute, fictitious interview, than with those who did; but facts were more apt to be recorded wrongly by students who did take notes.

Factors Influencing Reading and Other Study Habits and Skills

Personality

In an investigation by Jensen and Knecht (1968), in which introductory psychology class students at Brigham Young University were exposed to different types of persuasive written communications, none of the four personality measures studied was found to be associated with attitude change of either sex after exposure to a factual message, or for males after emotional message exposure. A conforming message was positively related to "intolerance of ambiguity" but negatively to "measures of anxiety" and "authoritarianism" in the case of males. For females, "self-concept" was positively, and "measure of anxiety" negatively, related to conforming appeal, while "measure of anxiety" was positively related to the emotional appeal. Fulton (1970), in a study involving approximately 250 undergraduate listeners, found three (out of five) personality factors (agreeableness, culture, and conscientiousness) to be significantly correlated with speaker credibility. Entwistle and Entwistle (1970), in their correlational analysis of *Eysenck Personality Inventory* scores, study methods, and academic motivation of British university and college of education first-year students and academic achievement, found indications of superiority of introverts and of students possessing good study habits, no relationships between neuroticism and achievement, and stability and introversion related to good study habits.

In study involving groups of male freshmen in liberal arts courses, Fitzpatrick (1970) found significant differential relationships of some study habits and attitudes areas (Brown-Holtzman) with course grades and student satisfaction in theology and history courses. Marso (1969) reported that University of Nebraska students who were exposed to less difficult unit examinations (50 per cent difficulty level) in an introductory Educational Psychology course achieved higher scores on the final course examination and studied more during the course than did those students who had the more difficult examinations (70 per cent difficulty level). Jones (1970) found no significant differences in SSHA scores among groups of Illinois community junior college students grouped in unstructured fashion or divided into various types of subgroups with or without instructor guidance. Kuder (1970) reported finding no significant differences between study habits of upperclassmen living in dormitories and those living in fraternity houses at the University of Oregon.

Word factors

In a study of free recall of 32 University of British Columbia students in a summer course in experimental psychology, Corteen (1970) found relatively more frequent recall of unfamiliar words when these were presented in mixed lists of familiar or unfamiliar words than when presented in unmixed lists. Hakes and Cairns (1970), in a study in which 20 introductory psychology students (serving as part of a course requirement) in each of two groups were asked to listen for words beginning with a particular letter in a sentence and to paraphrase a sentence, found comprehension better when relative pronouns were present that when these were deleted. When subjects in another study (Williams, Blumberg and Williams, 1970) were asked to match each of briefly exposed three-letter or five-letter artificially constructed words with one of a list of nonsense trigrams or quingrams, graduate and undergraduate subjects were found to be using strategies which were complex and involved both visual and oral cues, while kindergarten subjects made no use of consistent cues and first graders used initial and final letter cues. Muller (1970) concluded that a phonics approach would perhaps maximize instructional efficiency in beginning reading with children, after analyzing results obtained with ten volunteer subjects from upward division education courses who were assigned to various treatment activities with artificial letters and learned nonsense names for artificial words made up with the letters.

Poulton (1969) established different desirable combinations of ink density, content ratio between ink and paper, and brightness ratio by having adult subjects search for particular words in lists, under varying conditions.

Crain, Dieker, and Brown (1970) found the following increasing order of arousal effect (GSR and heart rate), in 62 Western Michigan University students, of "pleasant", "personal", and "adversive" words presented through five modes of communication: reading, listening, writing, speaking, and evaluation. Personal words had significantly more arousal effect than either adversive or pleasant words. The males in a group of Springfield College freshmen exposed to a film presentation of "good impression value" and "bad impression value" words were found by Walsh (1968) to recall more "bad" words than "good"; females in the group did not recall significantly more of either type. Sales and Haber (1968) found no differences among three groups of University of Rochester male undergraduate students, in large introductory psychology courses, in the naming of letters of tachistoscopically-presented "very frequent neutral", "very rare neutral", and "taboo" words, but they did find that clarity of letters was poorest for the "taboo" words, which they viewed as an indication of a perceptual defense effect. Sprafkin (1970) found experimental subjects' (male Ohio State University introductory psychology students) changes in synonym ratings and increase in confidence to use terms appropriately related to desire to please or to reach agreement with a counselor rather than the reported level of expertise of the counselor.

Illustrations

Dwyer (1970a, 1970b, 1970c) has presented further reports of his studies of use of visual illustrations in TV instruction. (An earlier report was presented at this conference last year.) Results obtained in this study, which involved an orally presented television lesson on the human heart and 157 Pennsylvania State University students in a speech course, indicated that, in general, the use of varied visual illustrations to complement oral instruction does not necessarily improve student achievement.

Listening

Brilhart (1970) found no consistent relationship between perceptual field-independence and attitude shift of groups of Pennsylvania State University student listeners when either the speaker was rated good and the speech of poor quality or the message was rated high quality and the speaker good; but she did find significant relationship between perceptual orientation and relative focus on speaker or message. When groups of undergraduate students took notes of "important elements" while listening to a recorded prose passage, Howe (1970) found a significant probability of recall a week later of important elements reproduced in students notes, but a very low probability of recall of items for which no notes were made. In a study of relative effects of four patterns of communication (O'Leary and Goldman, 1969) significantly more material was recalled by general psychology course subjects who listened to one rather than two transmitters and subjects who listened rather than talked and listened. In a study of comprehension or listenability of radio messages, involving cloze procedures used with Finnish University students, no significant correlation between judged comprehension and cloze score, but significant correelation between interest and comprehension, were found, leading Wiio and Nordenstreng (1970) to conclude that it is more difficult to separate interest and comprehension in spoken than in written messages, especially in the case of persons of lower education levels.

Time-Compressed Speech

When twelve groups of college students in psychology and education classes listened to a tape-recorded presentation of a listening selection at different rates, varying from 125 through 400 words per minute, comprehension and test results obtained by Foulke (1968) indicated a rapid decline in comprehension after 250 words per minute but not a statistically significant loss until after 300 words per minute. Goldhaber (1970) found the main effect of rate to be significant in listening comprehension of junior high school and college undergraduate students. He also found a significant main effect of academic level, with the scores of junior high subjects being significantly greater than those of college students. Sticht (1968), using one form of comprehension test as a listening test and the other form as a reading comprehension test, found no significant differences between listening and reading comprehension scores within groups of different mental aptitude levels; he did find an overall decrease as difficulty level of material increased. When George (1970a, 1970b) had different groups of Indiana State University freshmen listen to simplified and original versions of *Nelson-Denny Reading Test* selections, at different compressed speech rates, the decrease in retention was least following the slowest (125 words per minute) and greatest following the fastest (375 words per minute) rates, with significantly more forgetting occurring at the lowest rate, and with neither difficulty level nor retention interval playing a significant role. Reid (1968) used rewritten versions (reduced in grammatical complexity) of the comprehension test of Forms A & B of the *Nelson-Denny Reading Test* presented orally at four different rates, with Indiana University and University of Louisville freshmen and sophomores. When subjects were tested with the original questions, average comprehension scores were found to be greater with the simple than with the original material; comprehension increased, but not significantly, from 175 words per minute to 275 words per minute, but decreased significantly from

275 words to 325 words per minute, and from 325 to 375 words per minute. The finding that the simplified Form A yielded high comprehension but the simplified Form B version had no effect was interpreted as suggesting that the rewriting rules used produced inconsistent results, which were not detectable with the readability indices used. When Rocco (1970) obtained comprehension scores from 12 groups of college students who listened to compressed tapes which varied, among groups, in rate of speed presentation and length of pause times within a passage, he did not find any significantly beneficial effect on comprehension resulting from addition of varying pause times.

Mathemagenics

In a study in which thinking about the text they were to read was promoted in adult subjects in various ways, Frase (1970) obtained indications that finding difficult inferences results in high recall but does not promote correct inferences and that recall is a function of structural organization of text and ease in making verbal connections. In another study, Frase, (1969) found both productive and reproductive memory of groups of paid college subjects increasing with number and complexity of conclusions required while reading passages. In still another study (Frase, Patrick and Sebumer, 1970), one experimental group of educational psychology students, who read biographical texts with questions placed either frequently or infrequently in the text and before or after the relevant material, was compared with a control group who also read the text but without questions. The advantage of postquestions over prequestions diminished as the level of motivation or incentive (effected with varying monetary rewards) decreased, while the reward or incentive factor became dominant with infrequent adjunct questions. Peeck (1970) reported that an experimental group of Utrecht University students who had guessed answers to prequestions before reading a post-selection and another experimental group which had merely read the questions both achieved significantly better on delayed retention of question-relevant content (related to pretest questions) than did two control groups, one of which had no prequestions but equivalent extended reading time and the other which had no prequestions or extra reading time; but the experimental group's delayed retention of question-irrelevant content (related to new questions) was significantly inferior to that of the extended-reading-time control group.

Retention and Recall

Rogers (1970) reported that none of various degrees of alliteration had a significant effect on retention (at various intervals) of sentences presented to groups of University of Arizona introductory psychology class students; but with addition of capitalization or instruction attention cues there was significant facilitative effect on retention. When approximately 350 Washington Square College students in advanced psychology classes were given an objective test over material from introductory psychology courses which they had taken a previous term, approximately half failed the test. A low but significant correlation, .26, was found between number of semesters since the first course and test scores (Gustav, 1969). The written recall of a control group of ten college students who had read prose material aloud into a microphone 24 hours earlier was found by Kravitz (1969) to be significantly superior to that of an experimental group which, after reading prose aloud, had received delayed auditory feedback of their reading. Jensen and Anderson (1970) found that a control group which had read an unrelated prose passage after reading a passage concerning theory of personality satisfaction made more correct and less incorrect responses on a recall test than did an experimental group of Brigham Young University psychology students who had read a related but unfamiliar and more difficult passage after reading the original passage. Wong (1970) found no significant differences on tests of original learning among six groups of college sophomores in educational psychology courses who, after original reading of materials to be learned, had read a second passage which varied by groups in degree of similarity to the originally read material and where time of testing after interpolated materials read varied by groups from one to seven days.

News Media

Using interviews by graduate students of 200 Oregon householders, Lemert (1970) found television the only one of 4 media to which two advantages, "immediacy" and "better personnel", were attribtued by a majority of respondents; "completeness" and "habit" were seen as advantages for newspapers by slightly less than half of the respondents. In another study, involving British mass and elite newspapers and a discriminate function analysis procedure for classifying editorials, Namenwirth (1970) obtained indications that one (only) national newspaper does not necessarily reflect a single or national elite orientation.

Attitude Change

McCroskey and Combs (1969) studied the effects of analogy use on changes in attitude and source credibility. Tolela and Goldberg (1970) reported that articles on air pollution read by groups of Manchester College undergraduates were significantly more influential in effecting opinion changes when the articles were attributed to "high ethos" (high prestige credibility) groups than when attributed to either a "high ethos" or "low ethos" individual or collection of individuals. In another study of opinion change, by Stone and Chaffee (1970), university students in introductory journalism courses gave further indications that strongly message-oriented persons tend to focus heavily on content and to disregard or minimize source cues while the strongly source-oriented persons tend to slight message cues and focus on source cues. Tannenbaum, MacAuley and Norris (1966) found that presenting messages which posed arguments against a generally unchallenged belief and then refuting the arguments tended to reduce changes in attitudes resulting from subsequent messages attacking the belief. In a study (Orwant, Orwant and Pallak, 1970) carried on with Drake University social science classes, high level fear-arousing editorials, attributed to *Pravda* or *New York Times* and concerning chemical-biological warfare, seemed less effective than low level fear-appeal in modifying opinions on international cooperation with regard to chemical biological warfare, with source looming important in determining fear-arousal level. Culbertson (1970), in an investigation of factors influencing judgment and interpretation concerning controversial topics, carried on with two widely varying audiences (Michigan farmers and Ohio University students) and message topic (raising beef cattle and hard-line versus soft-line treatment of criminals), found confirmation for the hypotheses that core quantity (a function of size of context with which compared) would be defined by subjects as large when within-message context was small, with the hypotheses holding mainly when the context relevance was high.

Perception

Resnick (1970), using both children and college students in studying relationships between perceptual and syntactic factors, found both eye-voice span and stops increased with educational level; but college subjects who performed under perceptual strain read like third graders. She concluded that, while syntactic control is developed independently but not automatically as perceptual skill improves, perceptual control is necessary for the former to develop.

Other Factors

In a study of interest to and somewhat related to reading, Oldfield (1969) found that questionnaire responses obtained from over 100 students and staff members in two British university schools of music revealed left-handedness would be no more common in the group of musicians than in an undergraduate psychology population previously studied; and it did not appear to occasion any particular difficulty. Barnsley and Rabinovitch (1970) found no significant differences between preferred and non-preferred hand performance of 50 male and 50 female adults, concluding that the usual questionnaire technique for determining handedness is not dependable for determining range or differential manual proficiency and that "hand performance is the production of highly practiced and over-learned skills in the preferred hand (p. 361)."

Sears (1970), after analysis of writings of four authors with journalistic backgrounds and four with non-journalistic backgrounds, found the former group using shorter sentences and shorter words.

preferring active voice construction, selecting more strikingly vigorous word symbols, and using more personal words, a great amount of dialogue, and concrete words in preference to abstract ones.

Williams, Cannon, and Harding (1968) succinctly reported an experimental study allegedly carried on in men's and women's residence halls at the University of Nebraska to test the hypotheses that "learning and subsequent retention of information presented in the john is greater than learning and subsequent retention of the same information presented in a more conventional setting." Responses obtained with the questionnaire, intended to assess recognition of information in a handout on listening skills, led to the conclusion that "the personnel worker who wants to reach students must consider using the john to reach them [p. 331]."

READABIITY, TESTING, NEWSPAPERS, AND OTHER

Readability

Rentel (1970) had University of South Carolina and University of Tennessee upper class students predict four categories of words at three word-length levels on a cloze test of reading comprehension. Difficulty of predicting words increased significantly, but not uniformly, across all language categories as words increased in length, with adjectives being least affected by length and most difficult to predict and nouns and pronouns being easiest to predict. Tretiak's analysis (1969) of the 1961 edition of the *McCall-Crabbs Standard Test Lessons* and recalculation of the Lorge readability formula, which was based on the original 1926 *McCall-Crabbs Standard Test Lessons,* revealed that one of the Lorge formula factors, ratio of prepositional phrases, was unreliable and contributed little to prediction. When Burford (1970) applied the Dale-Chall readability formula to earth science textbooks of East Texas State University freshmen, he found readability levels of two texts were college level, three were twelfth-grade level, and one was eleventh-grade level. The reading levels of some 500 freshmen earth science students ranged from eight-grade to college level. Davis (1968) in comparing Flesch readability scores of 29 employee handbooks with the counterparts in the same organization 15 years earlier (at which time it was judged that 92 per cent of the handbooks studied were too difficult for intended readers), found a change in the predicted direction of more readability; but the change was small. He concluded that only 11 of the 29 handbooks studied were of suitable readability to reach those employees who lacked a college degree, the majority of employees. In the majority of news areas studied by Razik (1969), articles in metropolitan papers were found to be written at or below ninth-tenth-grade level (Dale-Chall), with those in the area of international news, states and national nonpolitical news, economy, and space at eleventh- and twelfth-grade levels. In a survey study made of science writing in several popular magazines, varying with respect to audience level, and two professional journals, to provide a reference base for high-level science writing, Funkhouser (1969) found measurable differences related to educational levels of audience targets for magazines. Average sentence length ranged from 16.8 words to 27.7; vocabulary (Dale list) from 23.8 per cent to 43.4 per cent; readability (Dale-Chall) from eighth- to eleventh-grade level.

Testing

Carr (1970) described the construction and tryout of a test of problem-solving ability in physical science in colleges, intended for use with nonscience majors. Carver (1970) has described the development of a test item which involves rewriting words, or "chunks", so that the changed meaning is detectable by readers of the original passage but not by ones who have not read the passage. He interpreted as evidence of validity the finding of significant correlations between scores obtained with chunked items and multiple-choice form items. Follman (1969), who presented an earlier report of his factor analytic study of critical thinking, English, and logical reasoning tests at a previous conference, concluded that critical thinking is a composite of specific small group factors rather than a general ability. Rainwater (1970a) applied both crude gain and residual gain formulas to reading score gains of Eastern New Mexico University Reading Program students. Significant gains were reportedly shown only by the crude gains method. Ramsay's study (1970), not directly connected with reading but of some significance for research frequently done with adults in reading, involved first-year psychology students at the University of Amsterdam who were required to be "volunteers" for experimental testing. Results obtained confirmed by the hypothesis that introverts volunteer early and extroverts late in the academic year, suggesting that samples from first year psychology students, at different times during the year, are not necessarily homogeneous.

Newspapers

Grotta (1969), in an investigation of attitudes on newspaper accuracy and external controls, found indications that suggestions for improving external controls on news coverage will be tolerated more by persons who give newspapers a low accuracy rating and that persons frequently in the news will give lower accuracy ratings than persons having little or no direct contact with newspapers. Among major causes of subjective inaccuracies found by Lawrence and Grey (1969) in newspaper reports in the San Francisco area were insufficient background information for reporters and lack of personal contact with the news source. Payne and Payne (1970), in a study of crime rate changes during the 1964 and 1968 Detroit newspaper strikes, found significant decreases (in comparison with a five-year average) in "nonexpressive" crimes, (such as robbery, burglary, and auto theft) during strike periods; the trends in "expressive" crimes (such as assault and rape) were inconsistent and not conclusive. Analysis of fourteen Black newspapers in the United States confirmed Stevens' hypothesis (1970) that the papers stressed racial harmony more than racial conflict and that cooperation both between races and among blacks was stressed.

Other

Relative stortage of reference books, with a bias against business and science, were among the findings resulting from a State University of Iowa School of Library Science (1969) survey of 389 of Iowa's 462 public libraries, with *World Book Encyclopedia* being the most common reference work (in 74 per cent). Only the following 5 of 64 reference titles checked were found in more than half of the libraries: *Webster's Third New International Dictionary* (65 per cent), *Book List and Subscription Books Bulletin* (61 per cent), *Twentieth Century Authors* (60 per cent), *Encyclopedia Brittanica* (53 per cent), and Helen Gardner's *Art Through the Ages* (51 per cent). Concern was expressed by the surveyors over the small number of libraries owning a number of specific, "inexpensive and indispensable" reference items. Irion (1969) analyzed a word count of spoken English made by Howes (which was treated in an earlier review) and found that 240 words made up three-fourths of the 250,000 running words of the sample used by Howe, with approximately 80 per cent of these stemming from old English sources.

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